KNOWLEDGE
AN
ILLUSTRATED MAGAZINE
OF
SCIENCE, LITERATURE, & ART

LONDON: FEBRUARY 1, 1888.

THE STAR OF BETHLEHEM.

IF there is one feature of popular converse about astronomy which indicates more clearly than another the generally-prevalent ignorance of science, it is the absurd nonsense now so often heard respecting what is called "the Star of Bethlehem." I suppose that at least 2,000 letters must have been addressed to me with inquiries about this non-existent orb. Again and again I am gravely told that the Star of Bethlehem has already appeared, its place of appearance being at one time Yorkshire or Devonshire, in England, at another Algiers or Constantinople or Tobolsk, at another a village in Kentucky, at another in Buenos Ayres or Rio Janeiro.

There are certain times when the Star of Bethlehem is sure to be discovered somewhere or other. One of these brought with it "Professor" Klein's discovery in Kentucky last summer; another was distinguished by the discovery of the erratic star by a young lady in Texas last November.

Luckily, a year and a quarter must elapse before the same Star of Bethlehem is likely to be discovered—somewhere about March 25, 1889; then again after a few months, on or about June 6, we are likely to hear that some village professor or some young girl or some sky-contemplating local lunatic has seen the Star of Bethlehem: after which it will not be till the end of October, 1890, that the mystic orb will be noticed.

Napoleon Bonaparte was one of the discoverers of the Star of Bethlehem; but he made a better use of it than the young lady in Texas or the "professor" of Kentucky. He pointed to it as it shone faintly in the heavens by day, and, instead of displaying ignorance, he took advantage of the ignorance of his officers, saying, "That is *my* star!" probably knowing quite well that the orb at which he pointed was Venus, a world nearly as large as that for a small portion of whose surface he had stained that surface with the blood of myriads of men.

For all the announced apparitions of the Star of Bethlehem the Planet of Love has been responsible. She always can be seen in full daylight for a few days at the time of her greatest brilliancy. And, although it is nowhere stated in the Gospel record that the Star of Bethlehem was visible in the daytime, it seems somehow to be taken for granted that it did present and will again present this exceptional peculiarity. Yet, by the singular perversity of ignorance, the very persons who look for the Star of Bethlehem by day, proclaim their belief that it is the star which is called Tycho Brahe's—a star which shone out in 1572 in the constellation Cassiopeia, and which could be seen all through the night all the year round in all the countries and places whence people imagine they have seen the mystic orb. Tycho Brahe's star, the situation of which is perfectly well known, even if the very star has not (as is probable) been identified with a catalogued eighth-magnitude star (shown in my large northern chart of 324,198 stars), does not pass below the horizon of any place in higher latitude than $26\frac{1}{2}$ deg. north. Whenever that star changes in brightness even by a single magnitude, astronomers will know of the change and may be trusted to attend to it; though not one among their number imagines for a moment that there is the remotest connection between that distant sun, probably at least a hundred years' light-journey from us, and the Star of Bethlehem.

The story of Tycho Brahe's star has been so often told, that I shall here say little on the subject, directing the reader's attention rather to the real story of the Star of the Nativity, as related by one who was probably not Matthew, since the Ebionites who accepted Matthew's as the only trustworthy Gospel rejected the story of the Nativity as a later addition, dating probably from about the year 110.

The history of Tycho Brahe's star differs in no important details from that of the equally brilliant temporary star known as Kepler's. It blazed out suddenly close by the star Kappa of Cassiopeia, the faintest of the four stars which mark the back of the Seated Lady's Chair. At first it was brighter than Venus at her brightest. This superiority was not due to the fact that the star was visible at night (whereas Venus is never seen on a dark sky), for the new star could be seen in the daytime. Probably, by-the-bye, it may be this peculiarity of Tycho Brahe's star which has led to the notion that whenever Venus is seen in the daytime the Star of Bethlehem has returned. But it speaks rather ill for the intelligence and information of the general public that because a star which has certainly nothing whatever to do with the Star of the Nativity, and which if visible now at all would show all night, was for a while visible in the daytime, therefore another orb which is not a star at all, and which returns periodically to daylight visibility, should be taken for that orb, although the place of Tycho Brahe's star shows in the night time no star even of the sixth or seventh magnitude.*

The statement that Tycho Brahe's star has been identified with two stars which shone out respectively in the years 945 and 1264 is far from justified by the evidence. On hunting over old records, two were found which very doubtfully suggested that celestial objects which might have been stars, but might also have been comets, had been seen in the years 945 and 1264, either of which might have appeared where Tycho Brahe's star was seen, or, on the contrary, might have been anywhere within a distance of 10 or 12 degrees from it. Of course, if these were merely apparitions of Tycho Brahe's star, which I regard as wildly improbable, then since an interval of 319 years elapsed between their appearance, and an interval of 308 years only between the later of the two and Tycho Brahe's star, it is evident the variable is not regular in its returns. And since 315 years have already passed since Tycho Brahe's star was seen, the prospect of a return of the star to visibility is somewhat doubtful, apart from the more than doubtful character of the evidence on which the identity of the stars or orbs of 945, 1264, and 1572 has been based. If, however, it should happen, as it very well may, that Tycho Brahe's star should blaze out within the next few years, the general

* An attempt was made to save the Texan Star of Bethlehem from detection as an impostor last October by announcing that though it had been visible for several days it had vanished, so that astronomers need not hope to persuade the world that it had not really appeared. But, unfortunately, that self-same supposed star was blazing out morning after morning as Venus, the Morning Star, while night after night, all that time, the place of Tycho Brahe's star was absolutely vacant so far as naked-eye vision was concerned, and occupied only for telescopic vision by an eighth magnitude star.

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public may rest confidently assured that its apparition will be in no way connected with the star described in the Gospel of Matthew.

As to that record itself, it is singular that any doubt should exist as to its meaning.

That the story relates to an astronomical event is of course certain. Had some meteorological phenomenon been in question the narrative would unquestionably have been otherwise worded. The event was certainly astronomical; the magi were certainly astronomers. Saying this is in effect saying that the magi were astrologers, and that the event was chiefly interesting in its astrological aspect. Farrar and Geikie in their lives of Christ follow all theologians of any weight who have ever dealt with the narrative of the Nativity in admitting this.

But theologians seem to be unconscious, one and all, of the overwhelming difficulty in which this interpretation lands them. We find them placidly discussing the widespread belief in astrological ideas and in the supposed influence of the heavenly bodies on the affairs and fortunes of the human race—not as if they were striving to get rid of a great difficulty, but as if the discussion were part of the explanation of the Star of Bethlehem. Not once, so far as my own reading extends (and this subject has been one about which I have read much) does any theologian note that the ideas of astrologers were altogether erroneous, and that confident faith in such fancies implies a degree of ignorance, not to say superstition, which however natural in the beginning of the Christian era, is entirely inconsistent with the belief that this portion of the first Gospel is inspired—as theologians understand inspiration.*

But perceiving the absolute impossibility of reconciling the story of the star of Bethlehem and its manifestly astrological significance with scientific facts, we are not merely led but forced to inquire whether some outside origin of the story may not be found. When we find that the Ebionites, though naturally disposed to view with special favour the Gospel of Matthew, rejected the story as foreign to the genuine narrative, we are encouraged to believe that decisive evidence on the subject must have existed in their time, which should be accessible also to us, since the Ebionites were not profoundly learned.

In reality the external origin of the tradition (once the inquiry is suggested) is as obvious as daylight.

The story of the star is told, in every detail, of the birth of each of the sun-gods—Osiris, Horus, Mithras, Serapis, and the rest.† But the original myth was not mythical at all. It belonged simply to the systematic observances which appertained to sun-worship as regulated by an astronomical and astrological priesthood. Each portion of the day determined by the sun's apparent motions was measured by astronomical observation, from the dayspring of one day to the dayspring of the next. In like manner each portion of the year determined by the sun's motion above and below the equator was measured by astronomical observations which were in truth religious observances.

The method of these observations is known, since it remained in vogue long after actual sun-worship had died out, and long after more exact methods of measuring the sun's yearly movements had come into use. Each stage of the sun's annual course was determined by the heliacal rising of a certain star, that is, the rising of the star at such a time that the star was just visible before the approach of the sun to the horizon obliterated all fainter lights from view. In variable climes this method would have no exactness at all. Even in Egypt and Chaldea it was but rough. But in point of fact all the methods employed by worshippers of the heavenly bodies were rough; for they were devised when as yet men knew little of astronomy, and they remained sacred afterwards (as always happens in such cases), despite their roughness and simplicity, partly even *because* of these.

Of all the epochs marking the sun's annual course the winter solstice, or the time when the sun's gradual descent below the equator ceases and merges into ascent, was the most important and critical in ancient times. In the earlier days of ignorance men must have feared lest the change would never be brought about, the sun passing away farther and farther south till he disappeared for ever, and with him all heat and light and life. The recognition of the fact that their god's southward course had ceased (that he was standing still, as the word solstice implies) restored hope to men's hearts, a hope changed to the certainty that he would return, bringing life back to the world, so soon as it was announced that he was moving northward from his staying place.

Later, when the religion of the sun was fairly established, the heliacal rising of a particular star was the sign for which the priests of the sun waited before they announced to the people the birth of the god of the new year. And therefore, later still, in every myth of the birth of the sun god we find this observance forming a prominent part of the story.

We have, in fact, in the story of the Star of Bethlehem, a simple repetition of what the priests of the sun actually did. They watched the sun, whose heliacal rising was to indicate the birth of the year god; as soon as they had seen that star in the east, just before the stars vanished with sunrise, they proclaimed the good news to the people. The magi, or astrological priests, watched the star in the east; the magi saw the newly-risen stars obliterated day after day by the sun of the old year (the slaughter of the innocents); the magi traced the course of the star in the east until, just at the time of the solstice (December 25, according to the old system), it came and stood over the place where the sun god of the new year was to be born, just showing above the horizon as his first rays proclaimed his approach. Then the angels or messengers of the magi announced the birth of the sun god of the year. And lastly, the magi or high priests offered up the people's gifts of myrrh, frankincense, and gold, all mystically typical of the solar worship—the sun being, in fact, in the old astrological system, represented by gold.

Such was unquestionably the manner of announcing the birth of the sun god by observation of the star of his nativity in sun-worshipping days—the details being essentially astronomical, or rather astrological. Those who can regard as accidental the agreement between all these details and the details of a story which appears only in one Gospel and was rejected by the very race who accepted that Gospel alone, must attach very little value to the evidence from multiplied coincidences.

If the explanation is rejected according to which this account is mythical and interpolated, then we have to accept the explanation given by leading theologians, accord-

* The erroneous ideas implied in this part of the narrative are not alone. The "exceeding high mountain" from whose summit "all the kingdoms of the earth and their glory" could be seen is as consistent with the science of eighteen hundred years ago as the star which appeared and disappeared and reappeared and finally travelled before the magi on their seven-mile walk from Jerusalem to Bethlehem; but it is entirely inconsistent with the geography as well as with the astronomy of scientific times. And it is hardly necessary to say that certain passages relating to the end of the world are written with manifest want of appreciation of the requirements of longitude and latitude and of a rotating world nearly 200,000,000 of square miles in area.

† Doubtless this was part of the evidence on which the Emperor Hadrian, in the year 137, based his belief that the Christians of his day were worshippers of Serapis.

ing to which the story corresponds with the astrological notions, admittedly mere superstitions, of those ancient days. I would ask whether it is more irreverent to maintain that a story which is *almost certainly mythical* and *quite certainly relates to a superstition* does not and cannot belong to the inspired word of God, or to tell the world that the inspired word of God may present ignorant and superstitious fancies as if they were truths. Men sometimes look at me sadly, especially if they are clothed in sadly cleric garb, when I reverently proclaim the former belief. They probably do not know how regretfully those of reverent mind contemplate their placid acceptance of the latter, a belief which *did they but recognise its true significance* they would perceive to be altogether irreverent.

SHAKESPEARE AND HISTORY.

THE character of Richard III., in Shakespeare's play of that name, has ever been considered one of Shakespeare's finest creations. Whether we consider the wonderful variety of aspects under which the hunchbacked tyrant is presented to us, or the force and spirit with which each is drawn, we are alike astonished and delighted. But this picture, which is so excellent an illustration of the poet's power, is no correct portrait of the third and worst of our English Richards, any more than the bodily distortion attributed to Richard III. is historically just.

So much variety of opinion has existed among historians in regard to Richard III., that it is difficult to form an opinion as to the man's real character. There is no part of history which is involved in so much obscurity as the War of the Roses. Many important incidents which, were they well authenticated, might assist us to form an opinion as to Richard's character, are differently stated by historians, or even by some entirely denied.

Possibly, I may remark in passing, the question of the character of our English kings may in itself have little interest for our readers, most of whom, I suspect, have gotten over the fashion of regarding the lives of the Kings and Queens of England as the most important parts of history. Men of sense regard our English kings as only important historically because of the immense amount of mischief their rapacity, ambition, and general villany have occasioned. Yet Shakespeare's creations are always worth studying, and we cannot but take an interest in the comparison of the picture of Richard III. drawn by Shakespeare and the real villain of history.

It was perhaps natural that Shakespeare, who wrote at a time when the intellectual progress that had begun when the Tudors were established on the English throne had reached a high development, should form an exaggeratedly unfavourable estimate of Richard III. It was natural that he should contemplate with something of horror a reign whose annals are so dark, and should ascribe to that king the largest share of the blame for all that disgraced his time—for the savage manners and the dishonourable conduct which characterised nearly all the leading men of that age. Another reason, probably, for Shakespeare's feeling of intense dislike for Richard III. was that the last king of the House of York was the personal enemy of Henry Tudor, the grandfather of that queen who, with all her faults, was the pride and glory of Shakespeare's time.* Some historians even confirm the story that Richard III. met his death at the hands of Henry VII.—a story naturally accepted by Shakespeare as dramatically effective; but there is not a shadow of evidence that they encountered on the field of battle. Had they done so, the event of Bosworth Field might have been different. For whatever his faults may have been, Richard was a stark warrior.

It is certain, be the explanation what it may, that Shakespeare has drawn Richard's character darker—which was by no means necessary—than historic truth would justify.

In the contest between the rival houses of York and Lancaster, Richard acquired early the reputation of a brave soldier and an able general. He does not appear to have been at that time in any way distinguished from his brothers, Edward and George, or the young nobility who fought in the same cause. Yet to this part of his life Shakespeare, following Holinshed, attributes two of the most brutal murders—the public stabbing of Prince Edward at Tewkesbury and the secret murder of Henry VI. in the Tower. Other chroniclers than Holinshed confirm Shakespeare in this, but it is exceedingly unlikely that Richard took any personal part in either murder.

In like manner, the murder of Clarence, which Shakespeare attributes to Richard, and represents Edward as regretting, was almost certainly ordered by Edward alone. Edward was as unscrupulous as Richard subsequently proved to be, and Edward's suspicions of George show that in all probability the three brothers were fairly matched in this respect. The Plantagenets, as a family, never allowed kinship to interfere with their ambitions, any more than did their Norman predecessors, or the Tudors, who succeeded the rival Plantagenet houses of York and Lancaster.

On the death of Edward, Richard does not at first seem to have entertained any idea of seizing the crown. He was justified in claiming the protectorate, not only by his near relationship to Edward, but by the general prejudice against the Woodvilles (the family of Edward's widow). But from the moment Richard obtained the regency he was placed in a position in which he found it impossible to maintain himself without constant watchfulness. The Queen's family began to form plots and intrigues against him. He knew that the authority he possessed while Prince Edward was a minor would not secure him against future dangers. The young Prince, as he grew up, would be most likely to side with his mother. Besides, he could scarcely but recall the fate of another Gloster who had held a similar position, and had been murdered when the Prince for whom he had held the reins of power had mounted the throne. It was with such dangers before him that Richard was led to assume the sovereignty, an act doubtless of treachery and villainy,

* Mr. Donnelly's assertion that the writer of the historical plays hated and even despised Elizabeth is fairly disposed of by the closing scene of "Henry VIII.," when the historical plays merge, as it were, into contemporary history:—

> "The words I utter
> Let none thinke flattery; for they'l finde 'em truth.
> This Royall infant, Heaven shall move about her;
> Though in her cradle, yet now promises
> Upon this land a thousand thousand Blessings,
> Which time shall bring to ripenesse; she shall be
> (But few now living can behold that goodnesse)
> A Patterne to all princes living with her,
> And all that shall succeed. Saba was never
> More covetous of wisdome and fair Vertue,
> Than this pure Soule shall be! All princely graces
> That mould up such a mighty piece as this is,
> With all the Vertues that attend the good,
> Shall still be doubled on her."

With much more to the same effect. All this in the folio edition, where Mr. Donnelly reads his Baconian abuse and ridicule of Queen Elizabeth. Note, moreover, that this was probably written after Elizabeth's death ("Richard III." was written many years before that event).

even though it was thus intended as a means of safety against the treachery and villainy of others. How far the character of his opponents would have justified the seizure of power from them need not be considered. The wrong was done against one who was at least innocent of any actual offence against Richard. Yet we must recognise some distinction between an act of rapacity almost essential to Richard's safety, and an act of villainy deliberately plotted against the innocent Prince, his nephew.

Up to this point in his history Richard had been far from encountering that universal hatred which is pictured in Shakespeare's play. On the contrary, he seems to have been rather popular than otherwise; and his accession to the regency was hailed with delight by the English people. But we enter now on a darker scene, of which this act was the prelude. It rendered Richard at once unpopular. Our English race has always, even in the days of its semi-savagery (the good old times, as some fondly call them), been quickly excited to indignation at the sight of the weak and innocent oppressed by the crafty and rapacious. The executions—murders though they perhaps were—of Rivers, Grey, and Hastings had been so much in accordance with the practice of those pleasant times, that they had attracted little notice and roused still less excitement. But in depriving the boy-Prince of his inheritance Richard was offending the whole nation, while exposing England to a repetition of those scenes of horror which had but lately ceased, and from the effects of which the country was still suffering severely. Accordingly, Richard found this measure received with so much indignation, and his new power so insecure, that the murder of the Princes seemed to him the only way to protect himself from those who were eager to restore to them their rights.

The murder of the Princes was Richard's destruction. The wrath of the English people at his usurpation turned at once into execration; and thenceforward there was no villainy of which they did not believe him capable, scarce any known to have happened during the evil days of the War of the Roses of which they were not prepared to regard him as the actual perpetrator. Men could scarcely believe that so unnatural a murderer possessed the form or attributes of humanity. It is difficult, even now, for any one of the English race to do such justice to Richard as should be meted even to so great a villain. We must not forget, however, that—though hanging would have been too good for him—there is a distinction between murder suggested by unscrupulous ambition combined with the dread of imminent danger, and that inherent ferocity and brutality, that love of cruelty for cruelty's sake, which characterises the Richard of Shakespeare's creation.

It is interesting to notice how Richard's crimes and their punishment were connected. The usurpation by which Richard had sought to make himself secure brought greater dangers with it. The crime by which he thought to protect himself against these led to his overthrow and death. We cannot wonder that even in the semi-savage England of the fifteenth century this should have happened. The light of chivalry, such as it was, had been dimmed amid the disorder and depression of the civil war; yet the nation was not slow to raise its voice in ominous tones against the king who had been guilty of a crime so cruel and so cowardly. Richard himself seems to have begun to recognise the finger of Providence in the misfortunes which now began to fall upon him. His demeanour and gestures during the latter part of his life indicated the terrors suggested by a guilty conscience. He continued to oppose with vigour and capacity the plots and intrigues which now thickened around him, but it was with evident anxiety as to the result. He could no longer trust his nearest friends. He could perceive fear and hatred ill-concealed in the countenances of all around him. When the storm which had so long been gathering on the horizon at length burst over him, Richard found the means he had prepared to stay its progress turned against himself.

Richard's conduct, however, in this last scene of his life was marked by singular courage and energy. He fought resolutely to the last, and he finally met defeat and death on Bosworth Field with all the valour for which the Plantagenets had long been famous.

In the Richard of history, then, we have a man distinctly different from the Richard of Shakespeare's play. Possessing energy and talents, and a high position in the nation, Richard III. found himself so placed that these advantages involved serious dangers. There seemed to him to be no middle course: he must either do or suffer wrong. That he chose the former in such an age, though it must be condemned, is not greatly to be wondered at. His character has been well summed up in the statement that "he differed little from the ordinary nobleman of his time, except that circumstances gave him the power to perform signal acts of treachery and to profit by them."

As regards Richard's capacity there can be no question. Every act of his recorded by history speaks of the man of energy and decision, who amidst plots and intrigues sees at once the best path for safety, and follows it without scruple or compunction. He would probably have failed had he attempted to oppose secret plots with craft and policy. He met them and dispersed them openly and vigorously. In the family of Edward's queen he had to contend with those who, having been raised from an humble condition, entertained a natural aversion to a prince whose family claims were older and stronger. They spared no efforts to bring about his overthrow.

We cannot rightly judge, however, of the character of the Richard of history, nor rightly appreciate the Richard of Shakespeare's powerful play, without considering the tendencies of that dark and gloomy age. In judging any man's conduct it is always important to consider the times in which he lived, but it is specially so in the present instance. There has seldom been an age whose character has been so marked as was that of the age preceding the Reformation. Generally in each succeeding era of a nation's history the elements of good and evil, of order and disorder, exist side by side—in different degrees, but still actively present, and in some degree counteracting each other. But at the close of the War of the Roses the elements of order seemed to have almost wholly disappeared. The very groundwork of society seems shaken. The kingly power, the Church, and the nobility, had all at the same time lost their influence on the people, while the people were, as yet, altogether unable to control their own destinies.

England had seen the throne occupied by the usurper Henry IV., the rightful king murdered, the lawful heir in prison. After the brilliant but short reign of Henry V. they had seen his son a mere puppet in the hands of the nobility—now in the nominal possession of power, anon flying for his life. It was natural that they should lose that devoted attachment which the kingly dignity had once inspired—an attachment which, worthless though it would be now, was once an important element of the nation's strength.

It was the same with the Church. The nation had seen its abuses laid bare by Wycliffe and his followers, and had also felt by bitter experience the change which had taken place from the comparative purity of former times. They noted the selfish and often evil lives of many who professed to be their teachers; they suffered from the rapacity and avarice of the priesthood of the time. We cannot wonder,

then, that the Church had lost the hold it had once had on the confidence, if not on the affections of the people.

The nobility had in large degree forsaken the chivalry of their forefathers, which, though coarse, was wholesome. They were no longer distinguished from the commonalty by valour or capacity, but only by splendour and luxury.

While the old order had thus passed away, the new order which was to replace it had not yet appeared. A sense of insecurity, accompanied by a dissolution of all restraints of honour, can be recognised in all classes in that dark era of English history. As Hume has well said, "All that we can distinguish with certainty through the deep cloud which covers that period is a scene of horror and bloodshed, savage manners, arbitrary executions, and treacherous and dishonourable conduct in all parties." If any man in that age had reason to feel its savagery, or was likely to be influenced by it, it was Richard. In the earlier part of the civil war his family were treated as traitors and rebels, his father was slain, one brother forswore himself and fought against his own relations, another murdered his traitorous brother, and he himself had been compelled to endure and inflict wrongs of the most cruel nature. His usurpation and the crimes which followed it were a very natural sequel to a life-experience so brutalising.

Of Richard's domestic life we know little. History gives no sort of support to the stories of domestic villany introduced as parts of the picture of the Shakespearian Richard. It is unlikely that the real Richard was a dutiful son or an affectionate husband, but history does record that he was a loving father. Nay, some historians attribute his worst crimes in part to his anxiety to secure the throne for his son Prince Edward.

ARCTIC ORIGIN OF ARYAN RACES.

THERE are few developments of the general doctrine of evolution more interesting than those which relate to language. The discussion of the origin of languages and dialects, and their development after they have come into existence, is sufficiently interesting; but more interesting still is the study of languages in their relation to the past history of races. It is as bearing on the evolution and development of races, much more than as bearing on the evolution of language, that philological researches chiefly interest the student of science.

There is one subject of special interest in the past history of races on which the study of language promises to throw light. Whence did each race first come? Whence, in particular, did that great division of the human race, the Aryan or Indo-European, to which we ourselves belong, take its origin? Over what regions, again, has this particular stream of human life flowed since first it had separate existence?

Of old, when the more thoughtful strove to deal with such questions as the diversity of language, they gave comparatively simple answers to such questions as these. It was enough to suppose that all men originally spoke one language, and that that language was miraculously confounded, insomuch that different sets of men and women (quite possibly different pairs) had to form different races and nations. There was no difficulty in all this to primitive thinkers. They could see no special reason why a single pair should not start a thriving race; indeed, they imagined the process repeated whenever some new race was to be originated, especially when it seemed to them that by such a theory either the importance of their own special family might be enhanced, or the specially undesirable character of their own enemies might be indicated.

The question of the origin of Aryan races was one of those with which primitive thinkers dealt in this simple fashion. It was enough for them to conceive the Japhetic, Semitic, and Hamite races to have sprung from three men, sons, indeed, of one father and one mother, but by special interposition of deity provided with different, nay, widely contrasted racial characteristics. It is to be presumed that, following on this special ordinance, there was understood to have been some arrangement by which the three great divisions of the human race, thus originated, were kept distinct one from the other—besides, of course, that miraculous ordering of things by which the degeneration of the descendants of a single pair was supposed (if any attention at all was given to this difficulty) to have been in some way prevented.

It is hardly necessary to say that the Japhetian theory of the origin of Aryan races has long since taken its place with students of science beside the Babel theory of the origin of languages. The Caucasian theory of Blumenbach, though it held its ground long enough to give wide circulation to the term Caucasian as a fit name for the Aryan races, has also long been abandoned. But no satisfactory solution had yet been obtained for the problem of the origin of the Aryans. Pott, Lassen, and Max Müller maintained that the highlands of Central Asia had in all probability been the cradle of these races; but there was very little evidence to show that this theory was correct. The chief argument used by those who supported it was based on the supposition that Sanscrit is nearest of all the Indo-European languages to the primitive Aryan—a belief, however, for which the evidence was very slight. We can clearly trace back the course of the Aryans into Lower India from the valley of the Ganges, and into this region from the Punjaub, into which region again they doubtless entered from the Hindoo Koosh. But we can trace them no farther back. It is true that the farther west of India we trace the language the less original we find it, insomuch that we may fairly infer that, while the Aryan Indians migrated to the south-east, the Aryans of Persia and Asia Minor migrated westwards. For all these sections of the Indo-European race we may find a cradle in the highlands of Central Asia west of Murtag and Belurtag. But we cannot conclude safely from this that those highlands were the cradle from which the whole Indo-European division of the human family came. The Greek, the Roman, and the Romanic languages may be referred to the same Central Asian source from which the Persian or Iranian and the Sanscrit were derived, and yet it would remain unproved that the Hungarian and Lithuanian languages and dialects were derived thence, and with doubt on this head would come in doubts as to all forms of Teutonic and Celtic languages.

Now the researches of Cuno, Geiger, Schrader, and Penka tend to show with constantly increasing force of evidence, that the languages of Middle and Western Europe were derived from regions lying north and east of these regions—in other words, from the regions around the Baltic. The Rev. Canon Taylor, in a paper of singular interest recently read before the British Association, points out that the evidence indicates the Baltic provinces of Russia, or what we used in old times to call Finland, as the central region from which the Aryan races spread—one great division travelling southwards and eastwards over the central highlands of Asia, to occupy India, Persia, and Asia Minor; another travelling southwards and westwards over Prussia, Poland, Hungary, Germany, Denmark, Gaul, and the British Isles. Each of these great divisions threw off branches in various directions, insomuch that we find the

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Aryans who had first spread eastwards extending themselves westwards beyond Asia Minor to Greece and Italy, while of the Aryans who had first spread westwards, some extended themselves northwards into the Danish peninsula, and then westwards and southwards over the British Isles, France, Spain, and even Africa (where the Kabyles are distinctively Aryan) and others passed from parts of Southern Germany eastwards again. On such points there must ever remain much doubt, but the evidence grows clearer and stronger, year by year, that the real centre of dispersion was in North-eastern Europe, and not in Central Asia.

MATERIAL OF THE UNIVERSE.

(*Concluded from page* 58.)

I TOUCHED in my last on the relative masses of the various members of the solar system, and in so doing considered in a sense their relative might, for on account of that mysterious power which matter possesses of attracting matter we measure the strength of each orb in the universe by its quantity of matter, to which its attractive action at any given distance is strictly proportional.

But there are other circumstances by which the importance of the several planets, measured by reference to the sway which each is capable of exerting on surrounding matter, is influenced, if not directly determined.

For example, consider the power which the sun has of communicating velocity to matter drawn to his surface from a distance. In this there is not only evidence of attractive might, but also of potentiality in regard to other attributes not less important to the sun regarded as the chief orb of the solar system. For the sun's light and heat, as well as other qualities which he possesses as a radiant orb, depend on this effect of his attractive energy. We do not, indeed, at present attach much weight to a theory once in vogue, according to which the sun's light and heat were regarded as due to the actual impact of meteoric bodies drawn toward him in countless millions from outer space. But the theory now generally accepted, according to which the sun's heat is the thermal equivalent of the mechanical process of contraction, going on constantly in consequence of the sun's powerful attractive action on the materials of his own globe, does in reality quite as definitely attribute his light and heat to his attractive energy as did the old meteoric theory; and we may take the velocity he is capable of generating in bodies drawn to him from great distances as affording a measure of his power—one might almost say his vitality—in this respect, quite as confidently as though the direct impact of such indrawn matter stirred his surface to intense heat, and so caused it to glow with intense lustre.

Now assuming as I do throughout my book (still in the stage of growth) that the sun's distance is 92,780,000 miles, which I consider probably far nearer the truth than Newcomb's ninety-two and one-third millions, I find that his mass amounts to 330,500 times the earth's, and that the velocity with which matter drawn to his surface from an indefinitely great distance would impinge vertically upon that surface is no less than 382·57 miles per second. It is hardly necessary to say that none of his dependent orbs compares with him in this respect. If a body were let fall upon Jupiter from an indefinitely great distance, being drawn to Jupiter's surface by that planet's sole attraction, the velocity of impact would be but 37·37 miles per second. In Saturn's case the velocity would be 22·58 miles per second; in Neptune's case 13·72 miles; in the case of Uranus 13·25 miles; in the earth's 6·913 miles (this represents the velocity of seven miles per second with which Jules Verne's Columbiad had to shoot forth those venturesome travellers to the moon); in Venus's case the velocity of impact, always supposing each planet left alone to generate the greatest possible velocity, would be only 6·218 miles per second; in the case of Mars it would be 3·179 miles; in that of Mercury 2·901; while lastly, our small companion planet, the moon, if left to do its best alone on matter approaching it from a very great distance, could not generate a greater velocity than 1·482 mile in each second of time—though this, by the way, is a considerable velocity, being about four times the velocity with which a cannon-ball leaves the mouth of the best cannon men have yet been able to construct.

But no planet is able to exercise its control on an approaching orb in this undisturbed fashion. There is only indeed a comparatively limited region within which the rule of a planet is superior to that of all other bodies, even including the sun. Each planet has in this sense a special domain, the limits of which are determined by the consideration that whereas a body outside those limits is drawn more strongly toward the sun than toward the planet, within them the reverse holds, and though it may be but for a time that the planet exerts superior influence, the influence of the planet on a body so situate is greater than that of the sun or than the combined influence of the sun and all other bodies whatsoever.

The sun, however, is the only orb whose power in diminishing the control of the several planets over surrounding space need be considered, all other influences being relatively insignificant. He affects the rule of planets in two distinct ways:—First, by his direct power in drawing matter toward him more strongly than any planet can, unless the body is comparatively close to its surface; and secondly, by communicating such velocities to bodies moving within the solar system that even when they enter the domain of a planet they remain within it but a short time. Since his power in both respects depends on his distance, or rather on the planet's distance from him, we find the outer planets set in a relatively higher position as independent rulers than the mere superiority of their mass would imply; nay, the outermost of the outer family is set absolutely higher in regard both to extent of domain and influence within such domain than even the two chief planets Jupiter and Saturn themselves.

I have calculated the extent of the domains of the several planets, and the velocities with which matter entering those domains would pass through them independently of the action to which they are exposed during their passage. The results are, I think, interesting, presenting, as they do, the relative sway of the different members of the solar system in a somewhat new light.

All the four terrestrial planets have domains very limited in extent compared with those of the four outer planets. The spherical domain of Mercury has a diameter of only 32,000 miles; and as bodies which chance to pass through it have velocities ranging up to no less than 42 miles per second, Mercury's chance of much influencing bodies passing near him is very small. Our own moon, though she has less than a fifth the mass of Mercury, has much more power in this respect, her domain being about 36,000 miles in diameter, while the greatest velocities of bodies passing near her are but 26 miles in a second. Venus has a domain 106,000 miles in diameter, and at her greater distance from the sun the maximum velocity of passing bodies is reduced from the 42 miles per second

noted in Mercury's case to only 30 miles. Our earth has a domain about 322,800 miles in diameter, and the maximum sun-imparted velocity of bodies entering that domain is 26 miles per second. As the span of the moon's orbit is nearly 478,000 miles, the moon is not within the earth's domain, nay, lies 77,500 miles beyond the range within which the earth's rule is supreme, so that the moon is to be regarded as a companion planet rather than as a mere satellite. Mars is the only member of the sun's special family of planets—for so I think we must consider the terrestrial planets to be—which has dependent bodies under its own special influence. For the domain of Mars is nearly 165,000 miles in diameter, while his satellites travel at distances of only 5,820 miles and 14,600 miles, respectively, from his centre. At the distance of Mars the greatest velocities of passing bodies, so far at least as solar influence is concerned, amount to 21 miles per second, and Mars can do little to perturb bodies moving so quickly, even though their course should carry them through the very midst of his domain.

So soon, however, as we pass to the wide region within which lie the paths of the giant planets, we find planetary domains far wider in extent and wherein planetary influences are exerted under conditions much more favourable. The domain of Jupiter has a diameter of nearly 30,000,000 miles, within which the whole system of the Jovian satellites, the span of which is but 2,800,000 miles, is swayed by the planet's supreme influence, slightly modified by the sun's perturbing action, indeed, but only in the same sense in which the motion of the earth around the sun is modified by the perturbing action of Jupiter. The domain of Saturn is even larger, but so slightly that one may speak of the domains of Jupiter and Saturn as practically equal. (Their actual diameters are, respectively, 29,824,000 miles and 29,912,000 miles.) And though the Saturnian system of satellites has nearly twice the span of the Jovian system, the diameter of the orbit of his eighth satellite being no less than 4,500,000 miles, yet this system is as completely under Saturn's control as the motions of the terrestrial planets are under the control of the central sun. Matter which has entered within these two nearly equal domains travels with sun-imparted velocities ranging up to eleven and one-half miles per second in the case of Jupiter and to eight and one-half miles per second in the case of Saturn. Over matter so moving both Jupiter and Saturn may exert very considerable influence, modifying not only the direction of motion, but also — which is a point of much greater moment — its velocity, and so modifying the span and period of orbital motion which such matter may have had around the sun. It is to be noticed that not only is the domain wide in each case within which either Jupiter or Saturn exerts superior influence, but the comparatively slow motion of sun-influenced matter through that domain causes the matter which has entered it from without to be much longer subjected to disturbing influence than it would be if it rushed along there with the velocities of 21, 26, 31, or 42 miles per second with which matter crosses the domains of Mars, the Earth, Venus, and Mercury. In this respect Uranus, with a smaller domain than either Saturn or Jupiter, and weaker influence within that domain, has an advantage over both those chief giants of the solar system. For the greatest velocity (sun-imparted) with which matter can pass through the domain of Uranus falls short of 6 miles per second. The span of the domain of Uranus is not far short of 24,000,000 miles, and the system of Uranian satellites, the span of which is about 1,000,000 miles, lies well within the limits of the Uranian domain. But Neptune is, of all the members of the solar system, the one whose domain is widest, and whose influence within his domain is most strikingly paramount. This domain has a diameter of more than 40,000,000 miles, and in volume it is nearly equal to all the other planetary domains put together. Matter passes through this domain when entering it by chance from without under solar influence only, with velocities which range no higher than $4\frac{3}{4}$ miles per second; and as Neptune is so powerful that matter drawn to his surface under his own influence alone would have a velocity of impact amounting to $13\frac{3}{4}$ miles per second, it is evident that Neptune must be capable of perturbing the movements of such matter in very large degree.

Such are the relations of matter as we find it distributed within our solar system. A total quantity of matter surpassing even the tremendous mass of the earth no less than 331,000 times appears in this system aggregated into various discrete masses, nearly all, however, being at the centre, whence it may not only influence but warm and illuminate all the rest. We see the various masses, according to their amount and position, exercising sway over larger or smaller regions of space, and over more or less important subordinate systems. We note, further, the antecedent probability—and the evidence obtained by observation assures us of the actual fact—that the larger these several masses are, the more they retain of the heat due to the primary process of their aggregation, the more nearly do they resemble the chief mass in their power to warm—possibly in their power to illuminate also—the bodies circling around them.

If these details of our solar system were not, though I think they are, most interesting in themselves, they would be made supremely interesting by the consideration that each one of the stars tells us of an aggregation of matter resembling our solar system doubtless in origin, though the circumstances of their formation may have led to different details alike of distribution and condition. Here in our solar system certain processes acting according to the known law of universal gravitation, and also according to those physical laws on which the generation of the so-called physical forces depends have led to the gathering together of an enormous central mass with the generation and steady emission of immense quantities of light and heat. Yonder in space we see in each star evidence of the steady emission of immense quantities of light and heat, assuring us of the past aggregation of immense quantities of matter. Our solar system is the one case we can actually study of the aggregation of matter under laws not yet clearly recognised, and still farther from being fully interpreted. It may perhaps be in one sense as hopeless to endeavour to guess how other such aggregations have been formed as it is to endeavour to ascertain from our earth's life history the life histories of her fellow-worlds, or from the condition of our moon the state of all such orbs as have, like her, passed onward to the final stage of orb life, the condition of death. But even as from the laws of the life of any one animal we can form a general idea of the laws of the lives of other animals, and as the study of one plant affords data for the determination of the general laws of plant life, so we may fairly infer the general nature of the final stage of orb life from the condition of our moon, the general laws of world life from the life history of our earth (so far as we have been able to read it), and lastly the general nature of other sun-circling systems from the study of the distribution of matter within our solar system, and the state in which the matter so distributed exists, whether in the supreme central mass, in the larger or smaller among the subordinate masses, or in the relatively minute subdivisions of the original material of the system which we recognise in asteroids and satellites, in meteorites, aerolites, and finally in the particles of mere cosmical dust whose presence is attested by the phenomena of falling stars.

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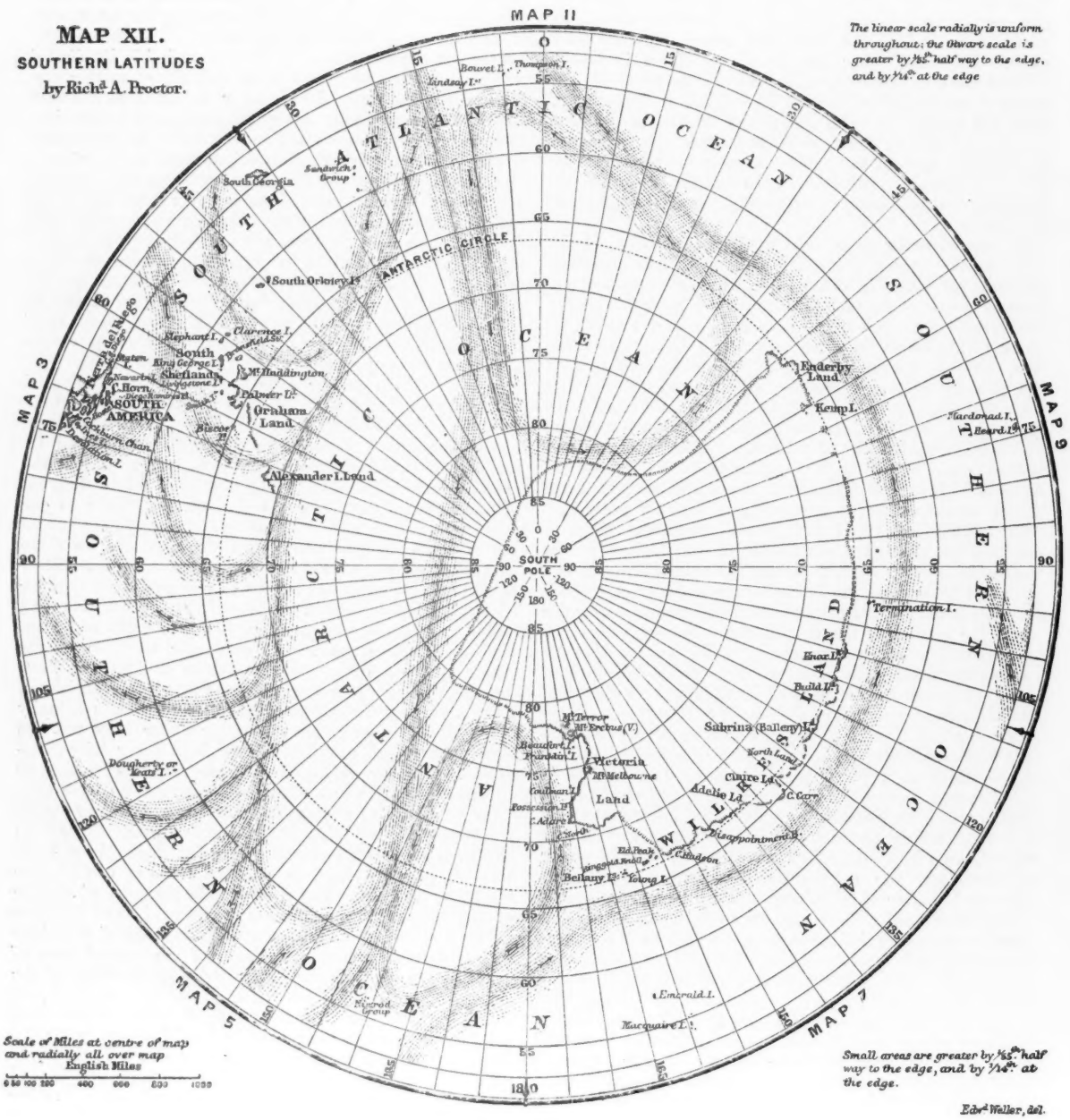
THE ONE-SCALE ATLAS.

MAP XII.
SOUTHERN LATITUDES
by Rich[d] A. Proctor.



The linear scale radially is uniform throughout: the Otwart scale is greater by 1/25th half way to the edge, and by 1/14th at the edge

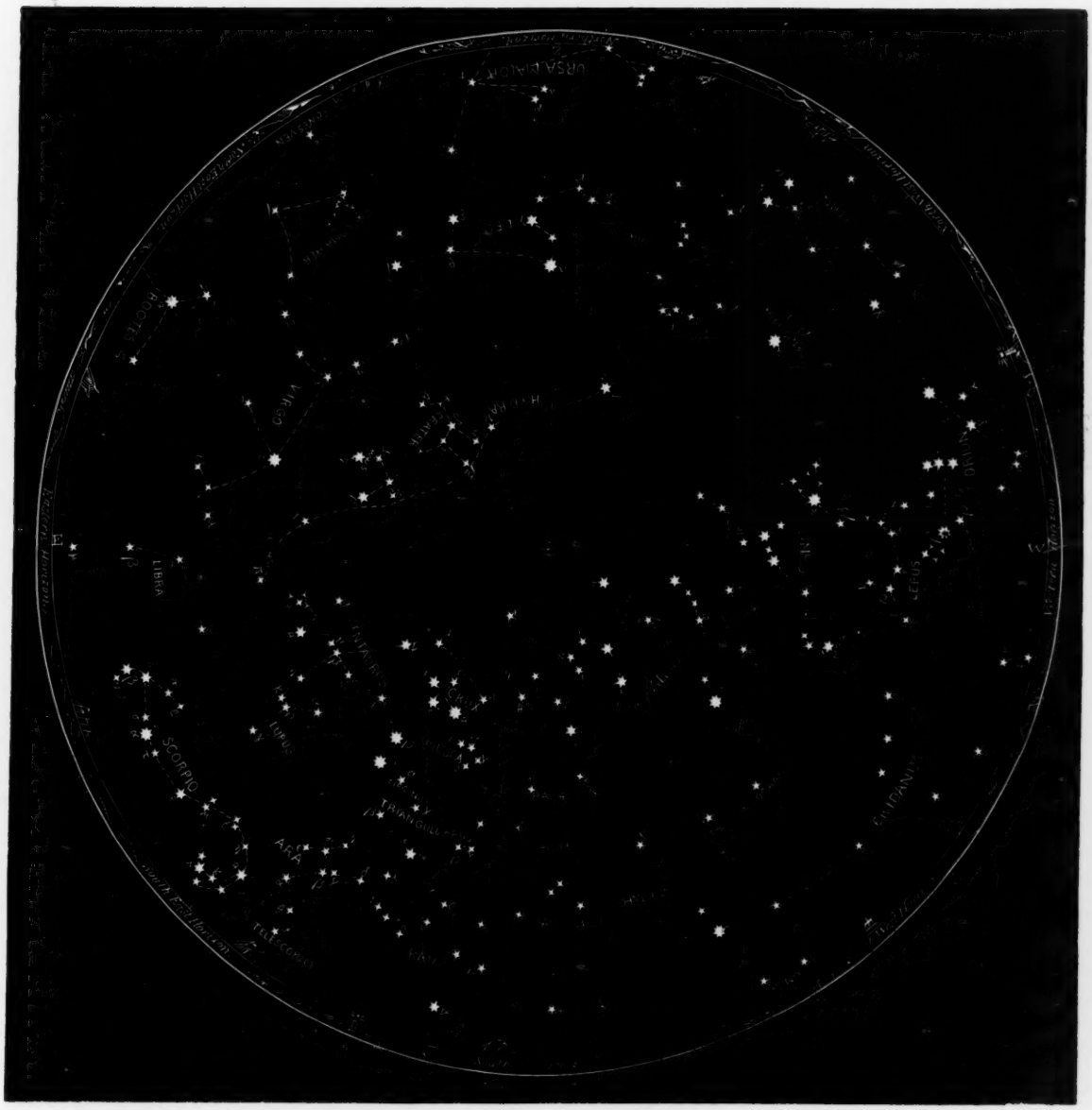
Scale of Miles at centre of map and radially all over map
English Miles
0 50 100 200 400 600 800 1000

Small areas are greater by 1/25th half way to the edge, and by 1/14th at the edge.

Edw[d] Weller, del.

THE SOUTHERN SKIES.

MAP XVI.—FOR JANUARY, FEBRUARY, AND MARCH.



THE NIGHT SKIES IN THE SOUTHERN HEMISPHERE (LAT. 46° TO 21° S.)
AND THE
SOUTHERN SKIES IN ENGLAND (UPPER HALF OF MAP ONLY) AT THE FOLLOWING TIMES:

At 1 o'clock, morning, Feb. 7.	At 11 o'clock, night, Mar. 8.	At 9 o'clock, night, April 7.
„ 12.30 „ „ Feb. 14.	„ 10.30 „ „ Mar. 15.	„ 8.30 „ „ April 15.
„ Midnight, Feb. 22.	„ 10 „ „ Mar. 23.	„ 8 „ „ April 23.
„ 11.30 o'clock, night, Mar. 1.	„ 9.30 „ „ Mar. 30.	„ 7.30 „ „ April 30.

STAR MAGNITUDES.

First . . . ✱ Second . . . . ✱ Third . . . . ★ Fourth . . . . + Fifth . . . . ▲

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ROYAL VICTORIA HALL.

(*To the Editor of* Knowledge.)

MR. F. W. RUDLER gave an admirable lecture on Tuesday, the 17th inst., on "Caves and Cave Men." The lecturer began by saying that the London clay, gravel, and sand are too soft to admit of the formation of caverns, which occur chiefly in the chalk and limestone. He showed, by photographs of the rocks near Flamborough Head and on the Dorsetshire coast, how the destructive action of the waves, keeping up a perpetual cannonade of small stones against the cliffs, washes away the softer portions of the rocks so as to form caverns. Water acts also by dissolving the chalk. The rain-water absorbs carbonic acid from the air, which enables it, as it trickles through the fissures, to dissolve a little of the chalk or limestone, thus gradually enlarging the fissures till it forms large caverns. Mr. Rudler, with the help of some beautiful photographs, explained how the water, charged with limestone, drips from the roof and forms stalactites and stalagmites—the former resembling icicles hanging from the roof, the latter formed underneath them by the drip, and rising in conical masses from the floor, or sometimes consolidated into a floor of remarkable hardness. The cave of Gayleureuth, in Germany, is of this kind. Under the stalagmite floor is a red-brown loamy earth, which has been long known to contain bones. Goldfuss and Cuvier discovered that these were the bones of extinct animals. In 1822 the skeleton of a large animal was found in a lead-mine in Derbyshire, and this proved to be the skeleton of a rhinoceros, an animal now found only in Africa. In the cave of Kirkdale, in Yorkshire, were found an immense number of bones, which Dr. Buckland ascertained to be chiefly those of the hyena, now met with only in Africa and Asia. Other bones which were found with them appeared to have been gnawed; and, comparing these with bones gnawed by hyenas in Wombwell's menagerie, Buckland found that they had been gnawed precisely in the same manner. Clearly, then, this had once been a den of hyenas. Other animals of which bones have been found in this or other caves are the cave-bear, the cave-lion, the Irish elk, and the mammoth. What this latter animal was like we are not left to infer merely from its skeleton, for a carcass of one was actually found in Siberia so perfectly preserved by the ice in which it was imbedded that dogs ate some of the flesh. It was a kind of elephant, with long curved tusks and long hair, fitting it to live in comparatively cold climates.

Was man living at the time when these animals existed here? Other caves enable us to answer this question in the affirmative. In 1852, Professor Boyd Dawkins found in Wookey's Hole, in Somersetshire, together with bones of the hyena and cave-bear, a number of stone weapons, evidently chipped and sharpened by the hand of man. In Kent's Cavern, at Torquay, are two distinct strata containing bones, separated by a floor of stalagmite 2 feet thick. The upper layer contains stone implements much less rude in construction, evidently the product of a higher stage of culture, together with needles and fish-hooks made of bone, and also the skull of a very formidable kind of tiger. These early men were not without some knowledge of art; for we find scratched on some of their bone implements very tolerable representations of the reindeer, the mammoth, and the Irish elk, and even of a hunt, with the figure of a man. The cave-men appear to have lived by hunting and fishing, with weapons of stone, bone, and wood, and to have clothed themselves with skins, which they sewed together with bone needles. When men took to agriculture and learnt to build huts, they, as a rule, no longer lived in caves. But caves have been used in later times as rallying-points, or for purposes of concealment or defence, or as places of sepulture.

The lecture was illustrated by excellent lantern views. It was listened to with profound attention, and greatly applauded at its close. The chairman, Mr. Marshall, announced that the lecture on the 24th inst. would be by Professor Bonney, F.R.S., on "The Oldest Monuments in Britain and Brittany." We understand that he will be followed, on the 31st, by Professor Ramsay, on "Speech made Visible; or Picture-writing as it was and as it is"; and that on February 7 Dr. Percy Frankland will lecture on "Germs in the Air"; and on February 14, Mr. E. Wethered on "Volcanoes and Earthquakes."

M. C. Martineau.

1 Clifton Place, Sussex Square, W.

NOTES ON AMERICANISMS.

Grist. A large quantity. So far as I know, this term is not used in this sense in England, even as a provincial expression.

Grit. A term for strength of character. It probably had its origin in districts where grindstones or millstones were much used; for the value of these depends on their strength or hardness of texture, and only sandstone possessing good qualities for grinding can properly be called *grit*, or be said to have *grit*. The term is probably in use in parts of England in the same sense, but I have not heard it so used, nor seen it in local papers or other provincial literature.

Gritty, naturally, as the adjective derived from "grit," signifies spirited or courageous.

Grocery, for a grocer's shop, is as much English as American; but "grocery" used for a bar-room is decidedly an Americanism. "Fetch on your groceries" addressed to a bar-keeper or saloon-tender signifies bring forward whisky and other spirits.

Groggery is, however, also used instead of "grocery," as equivalent to our English "grog-shop."

Ground Hog Day in certain States represents Candlemas Day (February 2), because the ground hog (*Arctomys monax*) is looked for on that day. If seen to come out of his hole and return to it on February 2 cold weather will last long; but if he stays out there will be an early spring.

Ground-nut. The pea-nut, so called because it buries its pods underground, after flowering, till the pods are ripened. The pea-nut is a peculiarly American institution, like chronic catarrh. It is characterised, so far as a stranger in the land can judge, by an entire absence of all desirable qualities, and several hateful ones, as a most unpleasant and diffusive odour, and a power of dispersing its shells over a singularly wide area during the process of consumption by free and independent youth.

Ground-peas. The pea-nut again.

Gruv for grieved is, let us trust, a true Americanism.

Guardeen. A quaint New England way of pronouncing *guardian*.

Guess, To. The use of this word to imply belief rather than conjecture is now an Americanism, though formerly pure English; its use where there is not only belief, but knowledge, is even more characteristically American, or rather Yankee, for the usage is provincial even in the States.

If we consider the origin of the word, which really signifies to *get*, we can understand that the meanings given to it should be varied among English-speaking races. Thus, when

"guess" is used to signify conjecture without any knowledge at all, it rightly represents the idea of *getting*, just as the word "find" is rightly used in such a sentence as "I cannot find the way." "Can you guess this riddle?" means "Can you *get* its answer?" even though every attempt depends on pure conjecture. But equally "I can guess your meaning" is correctly expressed, though it implies not mere conjecture without knowledge, but right opinion based on just reasoning. The first of the two American usages mentioned above is equally within the limits of the word's origin. Such expressions as "I guess it will rain," "I guess you're tired," and so forth, mean that such is the opinion I *get* on thinking about the matter, whatever it may be. And lastly, the use of the word "guess" to imply certainty very obviously corresponds with the idea of *getting* at some thought—getting at it *certainly* instead of doubtfully.

It appears to me that the American way of saying "I guess," "I calculate," "I reckon," and so forth, instead of expressing definite assent, is to be regarded as characteristic in much the same fashion that an Irishman's way of saying "I will," "I did," "I do," &c., instead of saying simply "yes," is characteristic. For I notice that in many other cases Americans use a method of expressing assent akin to saying "I guess so." Thus, you ask an American at table if he will partake of such and such a dish, and his answer, instead of being given in the usual English form, will probably be, "I believe I will." Again, if you ask whether in some matter the case is such and such, the answer may take any one of a score of different forms rather than simple "Yes"—from "That's so," or "That's the shape of it," down to "You may bet your bottom dollar," or "You may bet your pile," or "You may bet your boots on *that*." The true American seems to have a strange objection to saying simply "Yes." Even "Yes, sir," does not satisfy him, except where the expression of assent has to be very often repeated. Occasionally he may say (euphemistically, as Bartlett puts it), "Yes, sirreebob," a strange affirmative, which, so far as I know, has not yet appeared in literature, common though it is in conversation; but usually he prefers to say, "I guess that's so," or "I reckon that's about the way of it," and the like, though there is no real "guessing" or "reckoning" in the matter. Why this should be so, while his English cousin stands by the old ways and makes his yea yea and his nay nay, it would be difficult to determine.

In old English, by the way, "I gesse" seems to have been equivalent to the "ywis" of Chaucer, and to the "wus," "wusse," and "I wusse" of the less cultured characters in the plays of the early English dramatists. I have sometimes thought that the presence of the silent "u" in the later spelling of the word indicates a real connection between "guessing," "wissing," "witting," and so forth, even as the forms "guard," "guardian," &c., are connected with "ward," "warden," &c. But I suppose the connection between "guess" and "get" has been made out to the satisfaction of philologists, or it would hardly be so confidently insisted upon as it is.

GULCH. A deep ravine caused by the action of running water. The word is akin to the Swedish *gölka*, to swallow.

GULF STATES. Texas, Louisiana, Mississippi, Alabama, and Texas, the States bordering on the Gulf of Mexico.

GUM. The use of the word "gum" for gum-tree is probably purely American. And certainly the use of the same word for india-rubber, and thence for anything made of india-rubber, is strictly American slang. It will be remembered that not long since the *Saturday Review* (some of whose young buccaneers would write an essay on Gujerati, knowing nothing beyond plain English, or on the scenery of the river Lena, having seen but the Thames and Severn) gravely told its readers, in an article intended to crush these American notes of mine, that recently in Philadelphia the word "gums" had come to be applied to india-rubber over-shoes—or something "to that defect." As a matter of fact india-rubber shoes have been called "gums" for generations. The expression has been familiar, not only to my own ears, but in my own mouth, for more than fourteen years—ever since, in fact, in December 1873, my esteemed friend, the late Professor E. L. Youmans, enlightened me as to the use of the word by asking at the Century Club (about 2 A.M. on a frosty morning) if any one had seen his "gums." But for a *Saturday Reviewer*, who probably had never travelled beyond Margate or Brighton, it was something to know even *so* much—or so *little*—about Americanisms.

COLLISIONS AT SEA.

By SIDNEY G. D. ANDREWS.

MY attention has been drawn to an article written under the above heading in last month's issue of this paper, discussing the "Action of the rudder upon steam and sailing vessels." The writer has undoubtedly put forward an argument that at least would serve as a judicious warning to all seamen against the reckless use of the helm (especially the port helm). Yet his argument becomes somewhat weak when he infers that the present regulations ought to be modified.

Before I say anything of those regulations, I will first of all take the examples he has put forward to prove his case, and endeavour to show that neither of them in any way shows the regulations for preventing collisions at sea to be at fault.

His first example was when the Cunarder *Merlin*, leaving Halifax on a voyage to Bermuda, came into collision with "a large square-rigged vessel." He gives me nothing reliable to go upon as an argument, but simply quotes the commander's reply to his remark: "A pretty close shave that, Captain S——." "Yes, but if I had followed the sailing instructions we should not be here now to talk about it." The writer then adds that although he could not ask the captain to explain, still he "felt that at a critical moment his thorough seamanship had inspired him to do something which contravened official orders for such emergencies, but had saved their lives." I think those who have read his account of that collision, brief as it was, and also the commander's reply to him on this occasion, will almost doubt whether he realises that such an article as Art. 23 exists in the "International Steering and Sailing Rules," for if he did, I could hardly imagine him making use of such a sentence as the above.

Several years afterwards, the writer tells us, he was standing on the pier at Halifax, seeing some friends off. As the Cunarder *Alpha* shot out into the stream, he was asked by a friend (a shipowner), "What course will that steamer take when her helm is put to port?" The answer given by the friend was, "The stern of the vessel will be deflected to the left, and not the bow, which moves around in the direction you suppose." On observation, the writer says he found this to be correct.

In this, to a great extent, I agree with the writer that there is a considerable amount of deflection of the stern, consequent on the ship's answering her helm, and, so to speak, moving on a pivot placed amidships; but I do not think he is right in saying that it is the stern and not the bow that is deflected, for with a steamer going full speed ahead through the water and turning on her helm, the

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deflection of the bow naturally deflects the stern also. Then, again, has the writer taken into account whether his examples were paddle or screw steamers? and if screw, whether they were right or left handed, and whether in either instance the engines were eased or reversed to facilitate the turning of the ship? For the subject of the "action of the rudder upon steamers" can only be discussed jointly with the action of the screw on the ships, and in doing so it will be necessary to take an example where the ship is not under the influence of any current.

The next example given is the collision between the German ironclads *Grosser Kurfürst* and *König Wilhelm*. I refrain from commenting on this case, but would again add, Is the writer sure that the engines in either of these ships were not stopped or reversed? My reason for passing no remarks on this collision is because I do not recollect the facts of the case.

With reference to the collision between the *Stonington* and *Narragansett*, it is stated that both ships were approaching head on at great speed, and that the rule of the road was followed by both ships. Still they collided.

It seems to me that if in this case the rules and regulations were followed, it was done in a way not in strict conformity to the above rules, insomuch that it must have been left till too late, for we are told "there was not sufficient interval to allow for the stern deflection."

The rule of the road allows every officer in charge of a ship to exercise a certain amount of discretion, and this would expect both ships to have altered their course in good time, so as not to have had to put the helm hard over at the last moment, which appears to have been done. Of course this would be altered if it was thick weather, and the putting of the helm hard over would perhaps be unavoidable; on the other hand, if it was thick, they were most emphatically disobeying all rules by going at "great speed" in such weather.

In the writer's last example of a collision in the *Oregon*, he even goes so far as to show by diagrams that a collision would have been avoided if the *Oregon* had starboarded. I quite agree with this example of his; but to say that it would have been directly disobeying the rules and regulations &c. would be absurd. I can only think that if he has read the rules for preventing collisions at sea now in use he has not thoroughly grasped their meaning, and has missed Art. 23 altogether.

Of the steamer leaving a wharf in Toronto Bay, which was carefully lined by means of a stationary object, and which was found to be bodily deflected to the left when the helm was ported, I can only say that she, too, was most probably brought under the influence of a broadside current when her helm was being altered, and if not, will the writer inform me how it is that if a right-handed screw steamer is going full speed or any other uniform speed through the water ahead, and the helm is put hard over either way, the ship will describe a perfect circle, coming back to her former position exactly, always providing there is no current? I have seen this tested several times, and never known a ship out half her breadth.

I am sorry that any one should think that such able regulations as those provided by Government, not only of this country, but of all other civilised countries, and which are called "The International Steering and Sailing Rules" should require modification. I believe the writer is not alone in thinking so, but I can only say that in fifteen years' experience, ten of which have been in some of the finest steamers of England's mercantile marine, I have had cause to see these regulations well tried, and in cases where collisions have almost been inevitable, and in collisions themselves, I have never yet found the said regulations at fault, but always found, where used with discretion, that any seaman, whoever he may be, can put his whole trust in them. Of course, they cannot provide against the reckless use of the helm (as it is too often used) through which so many collisions occur; no regulations, whatever they might be, could do so. At the same time I firmly believe that any seaman who carefully carries out these rules, not thinking only of one, but taking all into account (including Art. 23), need never be afraid of losing his certificate through a collision, and in most cases will save his ship and all hands by adhering to them.

DARWIN'S LIFE AND LETTERS.

(*Concluded.*)

DARWIN worked at his rough notes on the variation of animals and plants under domestication, adding facts collected by "printed inquiries, by conversations with skilful breeders and gardeners, and by extensive reading," but still groping in the dark as to the application of selection to organisms living in a state of nature, until, as we have seen, the chance reading of Malthus suggested a working theory. A brief sketch of this theory, written out in pencil in 1842, was elaborated in 1844 into an essay of 230 pages, the importance attached to which is shown by a letter which Darwin addressed to his wife, charging her, in the event of his death, to apply 400*l.* to the expense of publication, and suggesting certain competent men from whom an editor might be chosen, preference being given to Sir Charles (then Mr.) Lyell, with whom he was on specially intimate terms and under much indebtedness—indeed, his acceptance of the uniformitarian theory of the "Principles" put him on the right track.

The correspondence between Darwin and Sir J. Hooker* in the earlier part of the second volume throws a flood of light on the collection and weighing of the materials for the future book, especially those supplied by the facts of geographical distribution; but, passing this over as difficult of condensation, we find that, acting on Lyell's advice, Darwin began to write out his views on a scale three or four times as extensive as that in which they appeared in the "Origin of Species." Happily, their publication was hastened by the well-known incident of the receipt of a paper in June 1858 from Mr. Alfred Russel Wallace, who was then in the Malay Archipelago, which "contained exactly the same theory," and which was accompanied by a request to Darwin, if he thought well of the essay, to send it to Lyell for perusal. This Darwin did forthwith, writing as follows:—

> Your words have come true with a vengeance—that I should be forestalled. . . . I never saw a more striking coincidence; if Wallace had my MS. sketch written out in 1842, he could not have made a better short abstract! Even his terms now stand as heads of my chapters. Please return me the MS., which he does not say he wishes me to publish; but I shall, of course, at once write and offer to send to any journal. So all my originality, whatever it may amount to, will be smashed, though my book, if it will ever have any value, will not be deteriorated, as all the labour consists in the application of the theory.

Darwin, as subsequent letters show, came out well in this business. For to have hit upon a theory which interprets

* This extract is especially interesting as "marking time": "I have read heaps of agricultural and horticultural books, and have never ceased collecting facts. At last gleams of light have come, and I am almost convinced (quite contrary to the opinion I started with) that species are not (it is like confessing a murder) immutable." Letter, January 11, 1844. Vol. II., p. 23.

so large a question as the origin and causes of modification of life-forms, to keep on turning it over and over again in the mind for twenty long years, to spend the working-time in every day in collection and verification of facts for and against it, and then to have another man launching a "bolt from the blue" in the shape of a paper with exactly the same theory, might well disturb even a philosopher of Darwin's serenity.

However, both Hooker and Lyell had read his sketch a dozen years before, and it was arranged by these two friends, not as considering claims of priority, which have too often been occasion for unseemly wrangling, but in "the interests of science generally," that an abstract of Darwin's MS., together with his letter to Asa Gray, should be read with Wallace's paper at a meeting of the Linnean Society, July 1, 1858. Sir Joseph Hooker says, in a letter to Mr. Francis Darwin: "The interest excited was intense, but the subject was too novel and too ominous for the old school to enter the lists before armouring. After the meeting it was talked over with bated breath. Lyell's approval, and perhaps in a small way mine, as his lieutenant in the affair, rather overawed the Fellows, who would otherwise have flown out against the doctrine. We had, too, the vantage-ground of being familiar with the authors and their theme."

Nothing can deprive Mr. Wallace of the honour due to him as the co-originator of the most important theory of our time, and in connection with this it is due to him to quote his self-effacing remarks in the preface to his volume of essays, as also Darwin's just tribute to him on its publication:—

> The present work will, I venture to think, prove that I both saw at the time the value and scope of the law which I had discovered, and have since been able to apply it to some purpose in a few original lines of investigation. But here my claims cease. I have felt all my life, and I still feel, the most sincere satisfaction that Mr. Darwin had been at work long before me, and that it was not left for me to attempt to write the "Origin of Species." I have long since measured my own strength, and know well that it would be quite unequal to that task. Far abler men than myself may confess that they have not that untiring patience in accumulating and that wonderful skill in using large masses of facts of the most varied kind—that wide and accurate physiological knowledge—that acuteness in devising and skill in carrying out experiments, and that admirable style of composition at once clear, persuasive, and judicial—qualities which, in their harmonious combination, mark out Mr. Darwin as the man, perhaps of all men now living, best fitted for the great work he has undertaken and accomplished.*

Darwin's words are as follows:—

> There has never been passed on me, or, indeed, on any one, a higher eulogium than yours. I wish that I fully deserved it. Your modesty and candour are very far from new to me. I hope it is a satisfaction to you to reflect—and very few things in my life have been more satisfactory to me—that we have never felt any jealousy towards each other, though in one sense rivals. I believe I can say this of myself with truth, and I am absolutely sure it is true of you.

Mr. Wallace modestly, but correctly, assesses his powers, and his subsequent entanglement in the meshes of spiritualism, combined with his hesitation to apply the theory of evolution to man in his *tout ensemble*,† make us thankful that the working-out of the details of the theory of natural selection was left to Darwin alone.

Shortly after the Linnean meeting Darwin set to work to prepare a series of papers which, always regarded by him as an "Abstract," ultimately took book form, and was published under the title of the "Origin of Species" in November 1859. In his own crisp, clear English, Professor Huxley describes the reception of that book, adding some interesting autobiographical matter, and we commend the reading of his chapter to a generation which, drinking in Darwinism from its birth, may learn with surprise what a storm and outcry both in clerical and scientific quarters its publication raised. "In fact," the Professor says, "the contrast between the present condition of public opinion upon the Darwinian question; between the estimation in which Darwin's views are now held in the scientific world; between the acquiescence, or at least quiescence, of the theologians of the self-respecting order at the present day and the outburst of antagonism on all sides in 1858–59, when the new theory respecting the origin of species first became known to the older generation to which I belong, is so startling that, except for documentary evidence, I should be sometimes inclined to think my memories dreams."*

As far as the larger number of naturalists and of the intelligent public who followed their lead were concerned, there was an absolutely open mind to receive a sufficing explanation of the mutation of species. There had been a long time of preparation and speculation. Evolution in one form or another is as old as Pythagoras and Empedocles, but although Herbert Spencer had removed it from the empirical stage at which it had remained for more than two thousand years, and placed it on an inductive base broad as the facts by which it was supported, and although Emerson, seer-like, felt it to lie at the heart of things, it was not in touch with the age until Darwinism gave it that practical form and human interest by which it could be seized on and applied in a concrete way. Dissertations on the passage of the homogeneous to the heterogeneous; explanations of the theory of the evolution of complex sidereal systems out of diffused vapours of seemingly simple texture, interested people only in a vague and wondering fashion, but when Darwin illustrated development by familiar illustrations gathered from his observations and experiments, and from intercourse with breeders of pigeons, horses, and dogs, and applied these to the question of the variation of life-forms, this went to men's "business and bosoms," and if the vulgar interpreted Darwinism as the explanation of man's descent from a monkey, or of the whale which was once a bear that had taken to swimming, the thoughtful accepted it as the master-key that unlocked the long-hidden mystery, not of origins, nor of the causes of variations, nor of heredity, but of the great agent, natural selection, which, operating on favourable variations, has brought about myriads of species from simple forms.

Among the men of "light and leading," Hooker, Huxley, Bates, and Sir John Lubbock were immediate converts, so were Lyell and Asa Gray, but with reservations; Henslow and Pictet went one mile, but refused to go twain; Agassiz, Murray, and Harvey would have none of the new doctrine; neither would Adam Sedgwick, who wrote a long letter of protest to Darwin, couched in loving terms, and ending with the hope that "we shall meet in heaven," while the unsatisfactory and "hedging" attitude of Professor (now Sir Richard) Owen is matter of history, as are the two pitched battles at the Oxford meeting of the British Association in 1860, immortalised by Huxley's annihilating rejoinder to Bishop Wilberforce's question as to the Professor's lineal relationship to an ape. But "the Lord was not in the earthquake," and the rumblings soon ceased, to be awakened for a little while when the "Descent of Man" was published. The first shock over, the timid were reassured, and, when the theologians, finding, like the Empress Helena in search of the true cross, what they looked for, saw anticipa-

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*"Contributions to the Theory of Natural Selection." Macmillan & Co. 1870.

† In a letter to Wallace, April 14, 1869 (vol. iii., p. 116), Darwin says:—"As you expected, I differ grievously from you, and I am very sorry for it. I can see no necessity for calling in an additional and proximate cause in regard to man. But the subject is too long for a letter."

* Vol. ii. p. 181.

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tions of the nebular theory and of the successive advance in life-forms in the first chapter of Genesis, and in the preparation for Christianity in Judaism, the more liberal among them welcomed the new evangel, and told us in their artless way that they knew it all before! Well had they kept the secret.

It is often said that a man's religion concerns himself only. So far as the value of the majority of people's opinions on such high matters goes, this is true; but it is a very shallow saying when applied to men whose words carry weight, or whose discoveries cause us to ask what is their bearing on the larger questions of human relations and destinies to which past ages have given answers that no longer satisfy us, or that are not compatible with the facts discovered. Whatever silence Darwin maintained in his books as to his religious opinions, intelligent readers would see that unaggressive—and wisely so, for the immediate work in hand—as was the mode of presentment of his theory, it undermined current beliefs in special providence, with its special creations and contrivances, and therefore in the intermittent interference of a deity, excluding that supernatural action of which miracles are the decaying stock evidence.

Nor could they fail to ask whether the theory of natural selection by "descent with modification" was to apply to the human species. And when Darwin, already anticipated in this application by his more daring disciples, Professors Huxley and Haeckel, published his "Descent of Man," with its outspoken chapter on the origin of conscience and the development of belief in spiritual beings, a belief subject to periodical revision as knowledge increased, it was obvious that the bottom was knocked out of all traditional dogmas of man's fall and redemption, of human sin and divine forgiveness. Therefore, what Darwin himself believed was a matter of moment, and his answers to inquiries which were made public during his lifetime told us what we expected, that while the varying circumstances and modes of life made his judgment often fluctuate, and that while he had never been an atheist in the sense of denying the existence of a God, "I think," he says, "that generally (and more and more as I grow older) but not always, an agnostic would be the most correct description of my state of mind." The chapter on "Religion," which, although a part of the autobiography, is printed separately, adds little to this bit of information—we were about to say this *confessio fidei*; but it is, as the following quotation shows, interesting as detailing a few of the steps by which Darwin reached that suspensive stage.

Whilst on board the *Beagle* I was quite orthodox, and I remember being heartily laughed at by several of the officers (though themselves orthodox) for quoting the Bible as an unanswerable authority on some point of morality. I suppose it was the novelty of the argument that amused them. But I had gradually come by this time—*i.e.* 1836 to 1839—to see that the Old Testament was no more to be trusted than the sacred books of the Hindoos. The question, then, continually rose before my mind, and would not be banished—is it credible that if God were now to make a revelation to the Hindoos he would permit it to be connected with the belief in Vishnu, Siva, &c., as Christianity is connected with the Old Testament? This appeared to me utterly incredible.

By further reflecting that the clearest evidence would be requisite to make any sane man believe in the miracles by which Christianity is supported—and that the more we know of the fixed laws of nature the more incredible do miracles become—that the men at that time were ignorant and credulous to a degree almost incomprehensible by us, that the Gospels cannot be proved to have been written simultaneously with the events, that they differ in many important details, far too important, as it seemed to me, to be admitted as the usual inaccuracies of eye-witnesses; by such reflections as these, which I give not as having the least novelty or value, but as they influenced me, I gradually came to disbelieve in Christianity as a divine revelation. The fact that many false religions have spread over large portions of the earth like wildfire had some weight with me.

But I was very unwilling to give up my belief; I feel sure of this, for I can well remember often and often inventing day-dreams of old letters between distinguished Romans, and manuscripts being discovered at Pompeii or elsewhere, which confirmed in the most striking manner all that was written in the Gospels. But I found it more and more difficult, with free scope given to my imagination, to invent evidence which would suffice to convince me. Thus disbelief crept over me at a very slow rate, but was at last complete. The rate was so slow that I felt no distress.

Although I did not think much about the existence of a personal God until a considerably later period of my life, I will here give the vague conclusions to which I have been driven. The old argument from design in Nature, as given by Paley, which formerly seemed to me so conclusive, fails, now that the law of natural selection has been discovered. We can no longer argue that, for instance, the beautiful hinge of a bivalve shell must have been made by an intelligent being, like the hinge of a door by a man. There seems to be no more design in the variability of organic beings, and in the action of natural selection, than in the course which the wind blows. But I have discussed this subject at the end of my book on the "Variation of Domesticated Animals and Plants," and the argument there given has never, as far as I can see, been answered.

Without doubt, the influence of the conclusions deducible from the theory of evolution are fatal to belief in the supernatural. When we say the supernatural, we mean that great body of assumptions out of which is constructed all theologies the essential element in which is the intimate relation between spiritual beings, of whom certain qualities are predicated, and man. These beings have no longer any place in the effective belief of intelligent and unprejudiced men, because they are found to have no correspondence with the ascertained operations of nature, which may or may not be the vehicles of Mr. Spencer's "Infinite and Eternal Energy," but which are not due to the fictitious demiurges of the type created by Kepler to account for the movements of the planets. The supernatural, or the natural—for from our standpoint the term matters little—remains unexplained. Darwin says, "I cannot pretend to throw the least light on such abstruse problems. The mystery is insoluble by us, and I for one must be content to remain an Agnostic." In the chapter already referred to, Professor Huxley says, "In respect of the great problems of philosophy, the post-Darwinian generation is, in one sense, exactly where the præ-Darwinian generations were. They remain insoluble. But the present generation has the advantage of being better provided with the means of freeing itself from the tyranny of certain sham solutions."* Science may borrow the Apostle's words, "Behold! I show you a mystery," and give to them a profounder meaning as it confesses that the origin and ultimate destiny of matter and motion; the causes which determine the behaviour of atoms, whether they are arranged in the lovely and varying forms which mark their crystals, or whether they are quivering with the life which is common to the amœba and the man; the conversion of the inorganic into the organic by the green plant, and the relation between nerve-changes and consciousness; are alike impenetrable mysteries.

There is no finality in science, but when we reflect how the major number of problems suggested by the universe, regarded only from a mechanical standpoint, have one by one been solved by the intelligence of man, the thought sometimes arises that the limits of knowledge may be reached, and that little remains to be discovered within the domain of the phenomenal beyond the filling-in of details; that, as an eminent astronomer who has proved the star-depths, and read the message of the most distant light-bringers known, remarked some time ago to the present writer, "the cream has been skimmed." The discoveries of the law of gravitation, of the distribution

* Vol. ii. p. 204.

and like chemical elements of the heavenly bodies, of the distance and size of large numbers of them, of the molecular constitution of matter, of the conservation of energy, of the fundamental identity of stuff in sun and planets and in all life-forms, and finally, of the mighty processes which have evolved the not-living and living totality of the universe from a diffused mass of vapour;—these are the triumphs of the human intellect, and now, perchance, it may not do amiss if it turn aside for a time to problems which are less remote, and in the solution of which the heart must play a large part—namely, the redress of social ills which make the "struggle for life" more severe among civilised races than among barbaric races and the lower animals.

EDWARD CLODD.

THE ORIGIN OF MAN.

PROFESSOR MAX MÜLLER has just brought out his "Science of Thought," the true object of which is to show that thought is an aspect of language, whatever that mysterious statement may mean. Fortunately Professor Müller explains at the outset that it really matters little or nothing whether we regard thought as he does or as men have hitherto regarded it——that is, as a process relating to objects, attributes, and acts, whose working cannot proceed without language of some sort. If ever Professor Müller's idea is established thought will go on just as it did before; or, as he himself puts it, "we should remain in every respect exactly as we were before, we should only comprehend our inner workings under new and, I believe, more correct names."

But Professor Müller has further undertaken in this new-old work of his to renew his attack on the general theory of biological evolution (of which the Darwinian theory is but a part), an attack which had considerable interest fourteen years ago, but is now wholly out of date. It is not to deal with Müller's worn-out objection that articulate speech separates man absolutely from all animals that I am now about to write of Müller and Darwin; but as Müller represents a type of anti-Darwinians which is very wide-spread, I propose to consider here the strange misapprehensions into which he and others of his type have fallen respecting the doctrine of biological evolution, which in its general form is now universally accepted by all whose opinion can reasonably be regarded as of any weight.*

The fatal error—fatal at least so far as understanding evolution is concerned—into which Max Müller and most other anti-Darwinians fall, is that of supposing that the modern biological doctrine of the origin of man regards the human race as descended from a single pair. "Popular scientific opinion now," says Müller (meaning, as the context shows, the ideas generally accepted as the teaching of leading biologists), "is decidedly in favour of one primitive pair of human parents—nay, it hankers for one primordial ancestor for all ancestors, and in the end for all organic beings."

If Professor Müller had said that this was the common misinterpretation of the teachings of Darwin and of Darwin's co-workers and followers, he would have been near the truth. Darwin speaks repeatedly of the ape-like progenitor of the human race, of man's anthropoid ancestor, and so forth; and his fellow-workers and followers have used similar expressions. Again, Darwin and the Darwinians speak of the probability that the primordial forms from which animal and vegetable life sprang may have been very few—four or five, perhaps—perhaps fewer—perhaps even but one. Probably Darwin and his followers have never conceived it possible that this way of speaking could be misunderstood.

Yet very soon after the "Origin of Species" was written, in which the descent of man from the brute creation was barely hinted at, the unscientific world began to picture a pair of gorillas instead of Adam and Eve as the progenitors of man; and a host of unknowing ones began to ask whereabouts the four or five bits of protoplasm appeared on the earth from whom the whole stream of life upon our globe has descended. The mistake is such an absurd one that, resulting as it does from the literal interpretation of Darwin's words, one rather wonders those words were not read more literally still, in which case the first and most obvious objection to be urged against the Darwinian theory would be that it makes man descend from a single progenitor, not from a pair, and descent from a single progenitor is very difficult to comprehend. Absurd as this is, descent from a single pair is, for one who knows anything about biological laws, altogether as difficult to accept as descent from a single ancestor, whether male or female.

But the fact is that no one who has studied Darwin's chief works (valuable almost as much for what they teach respecting evolution generally as for what they teach respecting the Darwinian theory) can for a moment imagine that *any race whatsoever* has sprung from a single pair, or even from a small number of progenitors. When he speaks of an ancestor, he means always an ancestral race. The ancestral anthropoid ape, for example, is not a single ape or a single pair, but that particular race of apes whose qualities, combined with the qualities of their environment, and eventually modified by the varying conditions of that environment, resulted in progressive changes by which the lowest race or races of man were developed.

The question as to the single or multiple origin of man which has been discussed among biologists has not been whether man descended from one pair or from many thousands of pairs, but whether the present races of man all descended from one race of anthropoid apes or from several such races. On this last point there is room for discussion; on the former none. Any one who considers the striking resemblance between certain of the least lovely among the African negroes and those unlovely African apes—the gorilla and the chimpanzee—will be disposed to credit some of the African tribes with descent from a race of African apes akin both to the gorilla and to the chimpanzee, but with superior opportunities of development toward the man-like type. In like manner the orang-outang and the gibbon ape may be regarded as nearer akin to the anthropoid ancestors of the aboriginal inhabitants of the East Indian Islands than any other apes now known to us. The ancestral apes from whom the savage progenitors of the Aryan, Semitic, and Turanian races were descended, seem to have left no descendants, nor have any of their near kindred; but the time may one day come when their fossil remains will be detected.

Possibly, if recent suggestions respecting the origin of the Aryan races may be accepted, we shall find the fossil ancestors of our own division of the human family in Finland. But it may well be that, as is urged by many Darwinians, the race whence gorillas and chimpanzees, orangs, gibbons,

* It is from no want of respect for Müller, whose position in his own scientific department is very high and thoroughly merited, that I include him among those whose opinion about Darwinism has no weight; it is simply because, like others of his type, he has not cared to make himself acquainted even with the elementary details of the theory he rejects. He is in that respect like a clerical person who, being asked by a friend of mine if he had carefully studied certain writings he had been enthusiastically objurgating, replied earnestly, "Thank God, I have never even seen them!"

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and other anthropoid apes, including the progenitor of ancestral savage man, were developed, was one; and these diverse forms resulted from the effects of environment and natural selection leading to the survival of the fittest.

In any case we must remember this, that even if we regard men and existing apes as directly descended from a common ancestral race, we must recognise not merely the probability but the certainty that all the races of apes have changed as much from that ancestral type as man has, or as have all races of men if we regard Caucasian, Semite, Nubian, Malay, and Polynesian as races having each their origin from some definite section of the primeval anthropoid stock. Even if the gorilla is the nearest among our ape cousins, it by no means follows that there have not been several races which—descended from the same common stock—would have been far nearer to man, had not circumstances led to their extinction. And whichever, even among such races, had been nearest to us if continued till now, would still probably have shown about twice the divergence which the common ancestral race had undergone on its progress towards man, since its progress towards that ape race (as it would now be) would have involved as much divergence in one direction as its progress towards man had involved in the other.

When we consider the real way in which Darwin regarded the development of a new race, and compare it with the way in which Professor Müller regards man as descended from a single pair, we shall recognise on the one hand the impossibility of a single pair being arrived at (except in a dying-out race), and on the other the impossibility of a single pair, even if of the most stalwart frame and of the soundest constitution, becoming the progenitors of a thriving race.

A new race is only developed when an old race which has perhaps continued long without change is exposed to new conditions, owing to some change in the environment. Then, and then only, comes into action the principle of the survival of the fittest (for when the conditions have long been unchanged, the bulk of the community are well fitted to survive). Now the very nature of the doctrine of the survival of the fittest requires that there should be many of the more fit or less fit, or of the more or less unfit, on whom the environment should exert its selective influence.

Observe that if the influences of the environment are too searching, the fittest indeed survive, but those thus fit are few, and at each successive generation the total number diminishes until extinction ensues. On the way towards such extinction there might well be at last only one pair left; but assuredly that pair would not save the race from extinction. The fact that a race once numerous had dwindled to a pair would suffice to render the extinction of the race certain. But when the influences of the environment, though potent, are not destructive, the numbers of the race, though they may be affected at first, are not diminished in the long run; and so soon as the process of development, whatever it may be, which is necessary to fit the race for its surroundings, has been accomplished, the race will begin to increase and thrive. So that the modified race resulting from the principle of natural selection will be numerous and thriving even at the beginning of its career, and grow more numerous while the conditions remain unchanged, to be again sifted out in some degree with further change in the developments, yet always eventually to grow and thrive—progressing towards greater and greater correspondence with its altered environment.

So much is true of all races developed by the process of natural selection. Many races necessarily perish in the process. But the principle of the survival of the fittest applies to races as to individuals. And so far as the biological problems actually before us are concerned, we have to consider only the races which *have* survived, not those which have died out.

Taking man, a race which, whether his origin was single or multiple, has most assuredly survived, we see that, whatever the conditions under which that particular race or those particular races which preceded savage man existed, there arose in some way a struggle for existence through changes in the surrounding conditions. This struggle caused some anthropoid creatures, very great in number, very thriving in habitudes, and well fitted to withstand change, to undergo marked development through the operation of natural selection, in such sort as to become men—uncouth, cave-dwelling, tree-climbing—in fine, savage, but still very certainly men. Besides those qualities, absolutely essential to their survival, the primeval anthropoids from whom man descended must have been very numerous, whether they belonged to one race and were to give birth to all varieties of men, or to several races, and were to give birth severally to several distinct human races. Not otherwise can a healthy, thriving offspring-race be even imagined, except by the operation of miracle, which science (never seeing miracles in operation) very properly and completely rejects.

Thus, while a numerous and a healthful race was reached before man began, from which race man was to be developed—not by the dying out of all save a pair, but by the survival of the fittest by hundreds of thousands—since the descent of the human or any other race from a single pair is, in fact, entirely inconsistent with all which experience has taught us—man may have descended from one ancestor, meaning one ancestral type, or from several, as is in my judgment (viewing the matter mathematically) altogether the more probable. But that man can have descended from a single pair is disproved doubly, first by the fact that, along the line of biological descent under crucial conditions of environment, no single healthful pair can ever have been reached, and secondly by the circumstance that if a healthful pair were artificially selected (all other members of the race being destroyed) to start a race, no healthy race could possibly descend from them (excepting always by miracle).

And now having attained a stage where some advanced form of anthropoid ape is likely to undergo a marked process of development, not necessarily including the acquisition of some kind of language, we see how the developing race might, as the very condition of their existence, have to form societies for mutual protection. Men, even in the beginning of their existence as such, and therefore their immediate progenitors, can never have been physically comparable with surrounding races. I am aware that the gorilla *is* so comparable; but that shows merely how *he* has diverged from the ancestral ape from whom man descended. Along the human line of descent social qualities were developed as essential to successful existence: the gorilla and kindred apes have made their successful struggle for strength through mere strength; and probably they have paid for it by a process of intellectual degradation as marked as the process of intellectual elevation by which their kinsfolk, men, have secured survival, and eventually thriving survival by social interrelations.

Imagine, then, a race of arboreal apes, weaker and gentler than the gorilla or orang-outang (even than these probably were before their present powerful frames were developed), and suppose such a race exposed to a struggle for existence constantly increasing in stringency, owing to the development of swift and strong carnivorous races around them, or in their midst. We may even perhaps imagine, further, the gradual retreat of this race of Pithecanthropoids, or ape-

men, from their forest domain to regions less densely wooded, and where they would soon be driven to seek shelter from the weather and from their enemies in caves, or to dig out sheltering homes in such places as they found suitable. To such a race, so circumstanced, three things would be chiefly necessary for safety—(1) the development of such reasoning powers as so advanced a race of apes may be fairly supposed to have possessed, since even the apes which have survived to our time, chiefly through mere brute strength, possess some reasoning power; (2) the development of the habit of using such weapons of defence as stones and sticks, which would involve a tendency not so much to the bipedal as to the bimanous condition; and (3) the development of such means of communication among themselves as would enable them to act in concert against their enemies, to give warning of the foe's approach, to give the signal of attack upon him, and when necessary to give suitable note of preparation for properly manœuvred retreat.

These necessities of a race so circumstanced are precisely such as the Darwinian theory regards as essential for the development of the required qualities. Those among the race who were dullest of apprehension, or least ready to make up by the use of sticks and stones for their naturally defenceless condition, or least prepared to make or to understand signals, vocal or otherwise, would inevitably fall victims in greater numbers to the attacks of their various enemies than those who were quick to reason, ready with their hands, and apt at signalling. Probably even the influence of weather would tend to destroy more of those who were inferior in the qualities considered than of those who excelled in them.

The dying out of the inferior in greater numbers would necessarily lead to the constant development of these qualities in higher and higher degree—natural selection operating as certainly in this respect as artificial selection, though more slowly.*

That reasoning powers far in advance of those possessed by the most intelligent apes of to-day might be thus developed by the continual selection of the cleverer members of a family and the dying out (relatively) of the less apt and ingenious, can scarcely be doubted when we consider how under artificial selection the intelligence of many classes of animals has been increased. That readiness in the use of the hands and a gradually increasing aptitude for going on two feet would also be developed, corresponds, of course, with what we know even of those apes which have had comparatively small occasion for handiness in the use of weapons or missiles.

Professor Müller and others deny the possibility of any sort of language being developed from such systems of signalling and intercommunication as would be necessary among a race of apes circumstanced as we have supposed. Yet when met by the evidence that the man of Neanderthal was almost certainly mute, Professor Müller admits that non-speaking men developed into men with the power of speech; and no difficulties in the problem of the development of speech from non-speaking animals on their way to fully speaking men are greater that we recognise when we consider the development of man as he is to-day from the unspeaking men of La Naulette. Observe, also, that the non-speaking ape did *not*, it appears, develop into speaking man, but into a mute creature lower than the lowest savage of our own time. The development of speech came after the development of man from the ape.

Professor Müller's argument that apes do not now develop speech has, then, no weight whatever, since no race of apes seems ever to have developed into speaking man, but only into a race of mute savages, such as the men of Neanderthal. Besides, the most advanced apes of to-day have probably degenerated in intelligence from their ancestry, while even those their more intelligent and less brutal ancestry were less intelligent and more brutal than the contemporary ancestry of man.

* Professor Müller strangely enough speaks of "natural selection" as a mere name, nowhere inquiring whether the sorting out of certain members of a race indicated in the Darwinian theory actually takes place or not, but entering into a preposterous argument about the word "selection" implying reasoning. It would be as reasonable, when a physicist speaks of the selective absorption of the spectroscope, to inquire not into the facts presented for consideration, but into the question whether a spectroscope can properly be said to select, which involves reason.

METEORIC COSMOGONY.

THE following letter appeared in the *Times* of December 22:—

I am not on my own account apt to be concerned by questions of priority, which indeed seem to me always somewhat puerile; but there is so much in the general theory advanced in the *Times* of November 18 as Mr. Lockyer's which has been for years the common property of science, that I must not allow my own accidental connection with a portion of the subject to prevent me from calling attention to the just claims of others.

The researches of Mayer, Thomson (Sir William), Helmholtz, and others involve (implicitly, if not, as in some cases, explicitly) the theory of the formation of systems like our solar system by processes of meteoric aggregation. I pointed this out in the preface to the first edition of my "Other Worlds," dated May 1870, noticing at the same time, I think fairly, that the line of reasoning followed in the chapter on "Comets and Meteors" in that work is new. (Five years before, in the preface to my "Saturn and its System," I had touched on the processes of aggregation by which, as distinguished from the processes of simple condensation imagined by Laplace, the solar system appears to have been formed.) In particular, I there showed that all the peculiarities of arrangement within the solar system find an explanation in the meteoric theory, while they are left absolutely unexplained by the nebular hypothesis.

But in reality the meteoric theory can only be accepted as based on multitudinous researches, astronomical, physical, and chemical, such as Mayer, Thomson (Sir William), Sorby, Graham, Dewar, Daubrée, Meunier, Tschermak, Helmholtz, Wright, and Newton (both of Yale College), and others have made, combined with spectroscopic researches like those of Secchi, Miller, Huggins, Vögel, and others. Doubtless in the paper read before the Royal Society Mr. Lockyer must have made some important contribution to one or other of these departments of research. In the voluminous report, however, which appears in the *Times* for November 18 I find only as novel the announcement that meteorites already known to contain the same elements as the sun and the stars can by suitable selection be made to give similar spectra. This, of course, was antecedently certain.

It is, however, satisfactory to find the theory of meteoric aggregation supported as warmly by Mr. Lockyer as the theory of Professor Clarke, of Cincinnati, respecting the compound nature of the so-called elements. Such support affords strong evidence that the theory is growing in public favour, as well as in the approval of men of science.

Believe me, faithfully yours,

RICHARD A. PROCTOR.

Corona Lodge, Orange Lake, Florida: Dec. 9.

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Gossip.

By RICHARD A. PROCTOR.

A CORRESPONDENT kindly sends me the following cheerful note:—

I have been in communication with a competent authority upon the subject of the assertions respecting Osiris and Horus made by you in KNOWLEDGE for October 1886, p. 346. This gentleman (*sic!*) says of these remarks: "The statement in question is utterly false. It is not founded upon a mistake, but is a deliberate fraud—which can hardly be called a *pious* one. It is a lie, and nothing else." Further on in his letter he says: "The writer" (I did not name you, sir, nor your magazine) "of the passages quoted is a deliberate liar, and there is no other judgment to be passed upon him."

As I am anxious to examine the evidence adduced by you for myself, I should feel greatly obliged if you would furnish me with your authorities. The statements I wish verified are that Osiris and Horus were virgin-born; that a star appeared in the east on December 25; that Osiris was at that time exhibited in effigy (will you please give the exact reference to the "Chronicles of Alexandria"); and that Horus was worshipped at Christmas time. I may also add that I have been unable to find the name of Pigord, from whom you quote in the foot-note, in any biographical dictionary. These particulars would, dear sir, be very acceptable.

* * *

I regret much that I am unable to give my polite correspondent the exact reference to the "Chronicles of Alexandria," a work which I do not possess, and believe to have been non-existent—save in certain passages by ancient authors—for many centuries. Mr. Bonwick, who refers to the Chronicles in his "Egyptian Belief and Modern Thought" (published by Kegan Paul & Co.), see pp. 143 and 157, may be able to tell my correspondent more on this point. Rigord (misprinted Pigord) is quoted by Higgins in his "Anacalypsis," vol. ii., p. 102. As another authority I would name M. Le Clerk de Septelemes's "Religion of the Ancient Greeks," p. 214, where it is mentioned that the ancient Egyptians fixed the pregnancy of Isis (the Queen of Heaven, and Virgin Mother of the Saviour Horus) in the last days of March, and assigned the commemoration of her delivery to the last day of December. For the star, see article in this number on the "Star of Bethlehem."

* * *

As for the virgin birth of both Horus and Osiris, it has been universally admitted that Isis, the mother of Horus, and Neith, the mother of Osiris, were virgin goddesses; Seb, the father of Osiris, was simply the celestial fire, and Osiris in turn only in a mystical sense and as Deity the parent of Horus. Both Horus and Osiris are called "self-begotten" as well as "virgin-born," their mothers being deities. I do not profess to be an authority, however, about such asserted processes, whether of self-conception or of incarnation. They cannot be regarded as belonging either to history or to exact science.

* * *

IT has been suggested by Mariette Bey, as formerly by the Abbé Dupuis, that Osiris was the nocturnal sun, Horus the sun of day. Volumes might be written, indeed, about the various suggestions which have been made respecting the Egyptian deities. I should have to refer my correspondent to a whole library of books for full information on such points, but it is abundantly clear that both Osiris and Horus were solar deities, and, like all solar deities, regarded as virgin born, and brought forth at the time of the winter solstice—determined in each age by the heliacal rising of some special star—with a number of other details reproduced again and again in the histories of long-departed heroes or teachers, even when the original lives of these had had nothing to do with the sun's birth and death and resurrection. These are ascertained *facts*, be their interpretation what it may.

I HAD almost forgotten to refer to my correspondent's "competent authority's" personal comments. I am not sure whether they belong or not to the order of denunciation typified by the amusing curse, "May God confound him for his theory of irregular verbs." If this "competent authority" does not apply to me in this sense, and for some kindred no-reason, an amusing curse, he is at least, like Artemus Ward's kangaroo, "an amoosin' cuss" himself. My correspondent should cultivate his acquaintance—not, however, as an authority, but as an awful example. Hitherto (let me suggest very gently) my correspondent does not seem to have learned all that the warning example of this particular "Helot in drink" might have taught him; or he would hardly have quoted remarks so singularly rude, outside their absurdity, as "this gentleman's." He will doubtless be wiser one day.

* * *

IN reply to a correspondent (Mr. J. E. Roose), *first*, I do not think the sun will ever be inhabited, but I do not know; *secondly*, the central orb of the universe, if such an orb there is, needs no centripetal force to keep it in its place, but I do not think there is such an orb, though here again I do not know; *thirdly*, I suppose when our system dies it will still obey the laws of gravity, seeing that a dead lion is as obedient to these as a live dog; and *fourthly*, I cannot tell why our earth's shining in past ages on an inhabited moon, if our earth ever did so shine, is to be represented "for the sake of argument" by "the reversed position" of a globe fifty times larger than ours (why larger?) shining upon the earth. There is, however, no "scientific opinion about the moon's having been inhabited," for "knowledge is of things we see."

* * *

I HAVE received several interesting and valuable communications respecting Mr. Faith's article about "Collisions at Sea." One of these I published last month; another I publish this month; and I have still a third which will interest readers of KNOWLEDGE.

* * *

AMERICANS of sense are relieved to find that those in their own country who took interest in Sullivan are matched by at least an equal proportion of persons in the old country taking interest in one who would be almost a match for a gorilla. Yet how much more interesting if the gorilla itself could be trained to pugilism!

* * *

THE *Saturday Review* remarks of me in a recent issue that I do not love it, while—*Saturday Reviler* though it has been called by the profane—it dislikes nothing and no one. I dislike many things myself: among others, untruth and unfairness. But to dislike a paper or a magazine would be preposterous. I know enough of journalism to be able to distinguish an article written by a student and a gentleman from one written by a charlatan and a humbug, or from another written by a soured "old woman" of either sex, even though all three articles appear in the same paper. Averaging my ideas about the *Saturday Review* as I have had occasion to regard it personally, I have rather a liking for it, for I have had occasion to observe in its pages—(1) Pleasant and strong notices of my work; (2) pleasant, though unfortunately weak, notices; (3) unpleasant notices, useful as giving me an opportunity of correction (with or without use of the thong); and, lastly, some notices, so manifestly unfair or so femininely spiteful that they were their own severest corrective, and could do me nothing but good, whether noticed or left alone. [I personally very seldom adopt the affectation of "letting abuse alone"—I "go for it," as my American friends say, enjoying the work heartily, and striving to do it thoroughly.]

IN the Jâtakas, or Buddhist Birth Stories, so called because they narrate the exploits of the Buddha in the 550 births through which he passed before attaining Buddhahood, there is a story called the "Flight of the Beasts," which the recent ridiculous scare in Birmingham—the "Brummagem scare," as we may name it—calls to mind.

* * *

THIS Daddabha Jâtaka tells of a hare who, sitting under a cocoanut sapling, thought to himself, "If this earth were to come to an end, where should I be, I wonder?" At that moment a bilra-fruit fell upon a leaf of the sapling, and so startled the hare that he scampered away, thinking that the event was really happening. Another hare, seeing him run, and learning the cause, started off; then a third and a fourth hare took to flight without knowing the reason, and so on until one hundred thousand hares in like manner followed their example. Likewise all the other animals who saw them, asking the meaning, went at headlong speed, and as the Bodisat chanced to see them, and heard what fear caused their flight, he bethought himself how to save them from destruction. So rushing with a lion's speed, he outstripped them, and then roaring a lion's roar, so that they halted affrighted, he asked them why they ran. And the elephants replied that they knew not what was the sign of the end of the world, but that the lions knew; and in like manner one beast after another answered until they came to the hares, and last of all to the first hare, who told the Bodisat of the falling of the bilra-fruit. The Bodisat then took the hare on his back, and bounded along to the forest where grew the sapling, when, as it chanced, a bilra-fruit fell upon the sapling, and the Bodisat returned with the hare to the assembled beasts, whom he dispersed with words of comfort.

* * *

AT Birmingham the bilra-fruit fell in the shape of an astrologer's prophecy that dire things would happen on January 11 by reason of the conjunction of Mars and Uranus. The old women (were they, after all, hares enchanted for the nonce into human shape?) scampered to the police stations, and, failing to get support or comfort from the constables, clubbed their pennies together and bought Bibles. Others stayed in their beds, their faith in the prediction confirmed by the Cimmerian fog that enveloped the town. And this is A.D. 1888!

* * *

OUR readers may like to know that Messrs. Longmans announce the publication of Mr. Edward Clodd's "Story of Creation" in the early part of this month. The substance of the book appeared in this Journal, but the chapters have been revised and in great part rewritten, while the text has the advantage of being illustrated by numerous woodcuts and diagrams. The price of the book is six shillings.

Reviews.

The Sinclairs of England. (London: Trübner & Co. 1887.)—Notwithstanding his bad grammar and worse construction, it is impossible to be angry with the anonymous author of this book. His overwhelming enthusiasm for his subject is such as to disarm criticism. Was there ever, in the world's history, the equal of this Sinclair family of his? If so, it will have to be sought for in the Heroic Ages. Descended from Odin, god of the Dacians, a Frankish branch of the Sinclairs settles in Neustria, allies itself by marriage with the family of Norse Rollo "the Ganger," and takes high position in the new Duchy of Normandy. No fewer than nine of its members cross the Channel with their cousin, Duke William, and fight by his side at the battle of Hastings; eight of these are rewarded with possessions and earldoms all over the conquered country, and become founders of the Sinclairs of England; the ninth goes north, becomes Steward of Scotland (predecessor in office, and perhaps ancestor of the royal Stuarts), and ancestor of the Sinclairs of Scotland. As time goes on more Norman kinsmen crowd into England till there is hardly a noble family there with which they do not ally themselves. And now the climax of their greatness arrives. When Henry I. died the real heir to the English throne was—a Sinclair! In the eloquent words of the author, "Had fees not been partible, even to kingdoms, and had the Salique law been preserved (both solvents avoided in matters of private estate to wonderful extent), the monarch of England now would be of this lineage, as the legitimate heir to Henry I., the last male of the Norman dynasty on the throne. The Plantagenets, Tudors, and Stuarts were, on principles of just primogeniture and true male consanguinity, interlopers. Since Henry schemed for his daughter Matilda, the crown of England has been the prize of adventurers, and not too high type even of that class. The Fulcs, or Plantagenets, were a lot of Gallic robbers, not of the gallant Viking, but of the common thief complexion; the Tudors were the fruit of a *mésalliance* of a queen of England, daughter of a French mad king, to a little brewer of Wales (and they have left sufficient proofs of their Welsh low origin by essentially weak, cruel, immoral, Celtic tyrannical inefficiency, Elizabeth, the greatest by far of them, being, in all human, if not legal, probability, not Celtic at all, but an energetic English London Bullen); the Stuarts were underling, provincial, and upstart, in the exact meanings of those words; but the Scandinavian Rollo line were royal time out of mind, and their conquests have been all of the royal order. . . . Nothing better than, nothing equal to, them, has ever walked the globe." What a loss the English people have sustained without knowing it! After such a singular example of self-abnegation on the part of these Sinclairs, we are not surprised to find that the family has gradually died out in England until, at the present time, an English Sinclair is a rarity. But who will say that their history was not worth writing?

Uppingham School Songs and Borth Lyrics. By EDWARD THRING, Head-Master of Uppingham School from 1853 to 1887. (London: T. Fisher Unwin.)—*Addresses on Educational Subjects.* By the same.—These elegantly printed and bound books will be hailed with pleasure by the Old Boys of the school whose fame its great head-master made. Probably to them the chief interest will be in the poems and lyrics, which teem with memory-kindling references to the anxious time of the happy sojourn of the school at Borth—happy to the boys, anxious to the governors and head-master of the school, uprooted from its ancient home, and dropped as from the clouds on the western coast; but to the general public the Addresses are highly deserving of thoughtful perusal. Every schoolmaster and every schoolmistress should study what this great master taught. Ill could he be spared from a profession half educated, badly organised, or hardly organised at all, and without a definite belief in the importance of its work. Teachers are not minders, schools are not crèches, and the work done by the teacher is not represented in value by the salary paid for it. Thring was pre-eminently a man who estimated his profession highly. His ideal was high. He appears in these pages as he was; not a provider of certain doles of Greek or mathematics, with which, for a consideration, he furnished his pupils. He did not measure them with a Latin rule only. The complex entity known as a

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boy, he maintained, has many sides; and he attacked him on all. No boy with an evident inaptitude for classics passed his school life on that account "under a cloud." Thring believed in finding out what the boy could do, and in seeing that he did that something well. In stimulating and guiding his clever boys, he did not neglect the dullards. "Stars imply a dark night around; and so it is oftentimes with the stars of a class." The Addresses abound with sparkling and keen allusions, and illustrations to points that should be in the minds of every teacher; and to those of this class who have their work at heart we cordially recommend these little volumes.

Serpent Worship and other Essays; with a Chapter on Totemism. By C. Staniland Wake. (George Redway.)—A great deal of nonsense has been written about Ophiolatry, and we regret to find that this book, which displays much industry in the collection of varied materials, is not a common-sense contribution to the subject. It is based upon discredited "authorities," and its conclusions are stale and fanciful. A really scholarly work upon what is an important department of animal worship is needed, and this Mr. Wake has not supplied.

The Creator, and what we may Know of the Method of Creation. By the Rev. W. H. Dallinger, F.R.S. (T. Woolmer.)—Dr. Dallinger's original investigations into the minutest life-forms have placed him in the front rank of microscopists, while his biological knowledge gives a value to this essay which is usually lacking in expositions of evolution from reverend pens. We have read this eloquent and able *brochure* with much interest, and with no small sympathy, for we are not slow in feeling with its talented author that all our ingenious explanations of processes do not touch the mystery of origins. But we cannot understand the invoking of a *deus ex machinâ* to account for the now impassable chasm between man and brute. Such a gratuitous assumption is probably made to render easier the passage to certain theological dogmas concerning man which find no support from the theory which Dr. Dallinger, as a Wesleyan divine, hesitates to apply to the evolution of man's spiritual nature.

Our Earth and its Story. By Dr. Robert Brown. (Cassell & Co.)—Dr. Brown ranks amongst our ablest and clearest expositors of the results of science, and he brings to the preparation of this book, which is the first volume of what is really an elaborate treatise on physical geography, the requisite knowledge and the skill of presentment which invest the record of the earth's changes with vivacity and charm. The work is well and lavishly illustrated.

The Saracens. By Arthur Gilman, M.A. (London: T. Fisher Unwin. 1887.) In reviewing a former volume of "The Story of the Nations" series, to which the present work belongs—we mean Professor Vambéry's "Hungary"—we spoke of its history as capable of being epitomised in the words "battle, murder, and sudden death." But the horrors of Hungarian history pale before those of that of the Saracens as told by Mr. Gilman, whose entire book is a sequent account of the most ghastly and ruthless slaughter, murder, treachery, violence, and deceit. As chapter after chapter teems with accounts of hideous carnage and butchery, our sympathy for the fiends in human form who perpetrated it evaporates, and we can only wonder that so relatively pure a religion as that of Islam should have bred, and been propagated by, such a race of ferocious and treacherous brutes. We read on and on, in a kind of vague hope that we may arrive at something like a peaceful settlement among those who owed allegiance to the Caliph, but in vain; and the exclamation of the villain in the melodrama of the old Victoria Theatre, "Wot, more bel-ood!" rises (in a more orthographical form) to our lips as we turn each successive page. But, *malgré* the revolting nature of his material, Mr. Gilman has given us one of the best popular accounts of the life and acts of Mahomet that has yet appeared, and has further shown how much more rapidly and effectually a new form of faith may be propagated with the sword than by any amount of missionary effort.

Electrical Distribution by Alternating Currents and Transformers. By Rankin Kennedy. (London: H. Alabaster, Gatehouse, & Co. 1887.)—Mr. Kennedy's small work is valuable, as containing information not to be found in any of our ordinary electrical text-books, and forms a useful addition to the library of the student of applied electricity. If the electric light is ever to compete with gas upon anything like a large scale, the cost of its production must be materially diminished, and the more the means of supply are simplified, the nearer we shall be to attaining that indispensable end. The most recent devices for obtaining alternating currents and the construction of transformers are described and fully illustrated in Mr. Kennedy's little book. There is a very good chapter, too, on measurements. The extent to which the volume is illustrated may be gathered from the intimation that no less than thirty-eight engravings appear in its sixty pages.

A Revised Currency System. By H. Bull. *The Instability of Gold as a Standard of Value.* Same Author. (London: Hamilton, Adams, & Co. 1887.)—All interested in the depreciated value of silver coin may read Mr. Bull's two essays with advantage. That a system should be perpetuated by which, to take a single illustration, soldiers and civilians serving in India are paid in rupees, such nominal rupee being only in reality worth some 1*s.* 5*d.*, seems nothing short of a scandal. Unfortunately, quackery is as rife in monetary theory as it is in medicine; and the present chances of the deposition of gold as the sole standard of value in the British Empire seem but remote indeed.

Laws and Definitions connected with Chemistry and Heat. By R. G. Durrant, M.A., F.C.S. (London: Rivingtons. 1887.)—This remarkably well-written little volume is not a text-book in the ordinary acceptation of the term, but rather a companion to the usual chemical text-books, heat being chiefly treated of in relation to chemical work. It will be found very handy by candidates preparing for examination. The descriptions of various tests and methods of analysis should be particularly useful to such candidates.

We have upon our table Books II. and IV. of *Moffatt's History Readers* (London: Moffatt & Paige), on "Early England" and "Modern England" respectively, in which a large quantity of historical information is conscientiously boiled down for the benefit of children attending elementary schools; also *Moffatt's German Course*, by G. H. Williams, M.A. (same publishers), sensible and practical; *Results of Rain and River Observations made in New South Wales, &c.*; *Notes upon Floods in the River Darling*; and *Notes upon Floods in Lake George*, in which Mr. H. C. Russell, the Government Astronomer for New South Wales, continues to add to the existing vast accumulated mass of statistics of the meteorological phenomena of that colony; *Bench Book for Test-Tube Work in Chemistry*, by H. T. Lilley, M.A. (London: Hamilton, Adams, & Co.), very handy for reference.

The Freshwater Fishes of Europe. By H. G. Seeley, F.R.S., F.G.S., &c. (London: Cassell & Co. 1886.)—Professor Seeley may fairly be congratulated on the value of his latest contribution to our knowledge of ichthyology, inasmuch as in the volume before us he describes the whole of the freshwater fishes of Europe for the first time,

systematically. His profusely and beautifully illustrated work is encyclopædic in its character, and should be upon the shelves of every student of the natural history and structure of the inhabitants of our rivers, lakes, and streams. And while the naturalist will find it an admirable work of reference, the angler will derive much information of the greatest value from its pages, and the *gourmet* gain many hints of modes of adding to his gastronomic pleasures. The variety of the fish which people fresh water will come almost as a revelation to the multitude who regard trout, jack, roach, dace, perch, and eels as constituting the major proportion, if not the entire bulk, of its denizens; for they will learn something of the history and structure of that strange survival from palæozoic times, the sturgeon; of the shad; of such rudimentary forms of creatures as the lampern, &c.; while those whose interest in fish may be said to centre in "little dinners at Greenwich" will discover that their favourite whitebait is nothing in the world but the fry of the herring. Doubtless Professor Seeley's work will become, as it deserves to become, *the* text-book of the subject to which it is devoted. The classification adopted is, in the main, the well-known and excellent one of Dr. Günther.

The Realistic Teaching of Geography. By WILLIAM JOLLY, F.R.S.E., F.G.S. (London: Blackie & Son.)—A more admirably common-sense little book than Mr. Jolly's has not recently appeared. It ought to be in the hands of every teacher of geography in the kingdom.

The Physiological Effects of Artificial Sleep. By Dr. MATHIAS ROTH. (London: Baillière, Tindall, & Cox. 1887.)—Dr. Roth has great faith in hypnotism, or artificially induced somnambulism, as a cure for various forms of neurotic disease, and in his small pamphlet gives a selection of cases to show how wonderfully efficacious this mode of treatment has proved. His *brochure* is worthy of study by all labouring under any form of nervous complaint, from the but too familiar neuralgia to those more obscure species of disorder in which the mind is more or less affected.

Humanism versus Theism is a series of letters by ROBERT LEWINS, M.D. (London: Freethought Publishing Company. 1887.)—There is no God but Lewins, and Naden is his prophet, may fairly be held to summarise the contents of this queer little tract. Mr. Montague Tigg in "Martin Chuzzlewit" "didn't believe that he didn't believe, hang him if he did," and Dr. Lewins seems drifting rapidly in the Tiggian direction.

Pneumatics. By CHARLES TOMLINSON, F.R.S., F.C.S. Fourth Edition, enlarged. (London: Crosby Lockwood & Co. 1887.)—Few writers in the present day possess the art of popular scientific exposition in a greater degree than Mr. Tomlinson; and in this fourth and enlarged edition of his well-known treatise on pneumatics, in "Weale's Series," he worthily sustains his reputation for rendering somewhat recondite physical questions easily intelligible to the reader ignorant of mathematics.

The Practical Engineer's Handbook. By WALTER HUTTON, C. and M.E. (London: Crosby Lockwood & Co. 1887.)—Arranged in a very convenient form for reference, Mr. Hutton's excellent cyclopædia of modern engineering workshop practice leaves nothing to be desired. Amply illustrated by no less than 371 woodcuts, and brought down in every department to the latest date, this is a volume which should be upon the shelves of everyone engaged in any of the numerous branches of modern mechanical engineering.

The Modern Treatment of Disease by the System of Massage. By THOS. S. DOWSE, M.D., F.R.C.P. (London: Griffith, Farran, Okeden, & Welsh. 1887.)—Among the latest of medical "fads" the treatment of disease by rubbing, pounding, and kneading the human body occupies a conspicuous place, and in the volume before us Dr. Dowse instructs us in the methods of "effleurage," "pétrissage," "tapotement," and so forth. This used, we imagine, to be called sham-pooing, but possibly we have arrived at the real thing at last. If, though, we ever, for our sins, were compelled to undergo this peculiar process, we think that, like Sarah Battle, we should prefer "a quiet rubber."

Recent Advances in Electricity. Edited by HENRY GREER. (New York. 1887.)—In a series of articles by the editor of the *Electrician*, Professor Thomson, and Professor Edison, an account is given of all the more recent advances in applied electricity; and we have illustrated descriptions of the latest devices for electrical storage, of the method of telegraphing from a train in motion, of a navigable balloon or air-ship electrically propelled (with a cheerful engraving of the destruction of a town by shells or bombs dropped from the car thereof), of Mr. Edison's contrivance for the production of electricity direct from fuel, and so on. This pamphlet will be found useful by all engaged, either practically or theoretically, in the study of electrical science and art.

Bulletin of the United States Fish Commission. Vol. VI., for 1886. (Washington, 1887.)—In the 474 pages which make up this volume will be found an enormous mass of detail in connection with the breeding, rearing, catching, curing, and even cooking fish, derived from information supplied from all parts of the world. The interest and importance of this will become apparent when we reflect upon the incalculable wealth of food which fish might supply, and to how very limited an extent we avail ourselves of it. There is a certain fitness in our receipt of this valuable work at the time when an Anglo-American Commission on International Fishery is sitting in the United States.

The Microscope in Theory and Practice. Translated from the German of Professor CARL NAEGELI and Professor S. SCHWENDENER. (London: Swan Sonnenschein, Lowrey, & Co. 1887.)—This translation of a portion of Naegeli and Schwendener's well-known work (partly made by Mr. Crisp, though mainly by Mr. J. Mayall, jun.) may supplement our leading English text-books, but will assuredly never supersede them. At almost inordinate length, its authors enter into details a large proportion of which are to be found in such books as Dr. Heath's admirable "Geometrical Optics," to the exclusion of matter of much more real interest to—because less accessible by—the observer with the microscope proper. The small part of the volume devoted to technical microscopy is huddled up to make room for all this and cognate matter on polarisation. The portion on testing the optical power of the instrument would be useful to our opticians, but for the fact that they happen to be familiar with it already. The really valuable part of the book is that which is explanatory of microscopic vision, and which treats of the theory of microscopic observation generally. All those who conceive that the images of the markings on a diatom are produced in the same manner as that of a church spire in a landscape viewed with the naked eye, should study this portion of the work before us carefully. They may do so profitably and with advantage.

Sprains. By C. W. MANSELL MOULIN, M.A., M.D., F.R.C.S. (London: H. K. Lewis. 1887.)—It is a common saying that a simple fracture is not half so bad as a serious sprain, although undoubtedly in a large number of cases the gravity of the latter form of injury is too much underrated. As Dr. Moulin says in his preface

to the excellent and thoroughly practical little volume now before us, "It has been said, and not untruly, that in all probability half the crippled limbs and stiffened joints that are met with every day date their starting-point from the occurrence of some apparently trivial accident of this description." It is, then, to a practically exhaustive account of the nature and treatment of this grave form of lesion that our author devotes his work; and, although addressed primarily to the surgeon, it is written in such perspicuous and untechnical language that the layman may read it both with pleasure and profit. Dr. Moulin advocates more active modes of treatment (including galvanism, massage, pressure, &c.) than those ordinarily adopted; and no one can, we think, rise from the perusal of his book without being convinced that his ideas on this subject are justified alike by science and by common-sense.

Sound, Light, and Heat. By MARK R. WRIGHT. (London: Longmans, Green, & Co. 1887.)—*Earth Knowledge.* By W. JEROME HARRISON, F.G.S., and H. NEWLAND WAKEFIELD. (London: Blackie & Son.)—*Mineralogy.* By FRANK RUTLEY, F.G.S. (London: T. Murby.)—*Euclid,* Book II. Arranged by A. E. LAYNG, M.A. (London: Blackie & Son. 1887.)—*New Explanatory Readers,* No. VI. *Geography* for Standards I. to VII. (London: Moffatt & Paige.)—*Problematic Arithmetic.* Edited by Rev. A. D. CAPEL, M.A. (London: Joseph Hughes.) —The mass of educational works whose titles we have grouped above are all more or less directed to the furtherance of that vicious system of examination whose ultimate result can only be that of cramming the rising generation with everything and teaching them nothing. The first three books on our list, however, are really too good for their professed purpose. Mr. Wright has boiled down Tyndall, Sedley Taylor, and Ganot in a fashion calculated really to impart a considerable amount of sound information. The "Earth Knowledge" of Messrs. Harrison and Wakefield is an honest and readable treatise on the bastard science of "physiography," and as absolutely superior to a volume bearing the latter title, recently issued from South Kensington itself, as it is possible to imagine. Mr. Rutley's "Mineralogy," too, contains a very large amount of information indeed compressed between its two covers. The rest of the works specified demand no special notice.

THE FACE OF THE SKY FOR FEBRUARY.

BY F.R.A.S.

THE sunspot minimum having now passed, the observer may scrutinise the solar disc for spots and faculæ on every available opportunity, with a fair prospect of occasionally picking up both. The zodiacal light may be seen, somewhat to the south of west, after sunset, towards the end of the month. The night sky will be found depicted on map ii. of "The Stars in their Seasons." Minima of Algol ("The Stars in their Seasons," map xii.) will occur at 1h. 30m. A.M. on the 10th; at 10h. 19m. P.M. on the 12th; at 7h. 8m. P.M. on the 15th; and at other dates less convenient for the amateur for whom these notes are intended. Mercury is an evening star all through February, and attains his greatest elongation east of the sun (18° 5′) on the 16th. About this time he may be detected close to the horizon after sunset with the naked eye. He will be over a point to the south of west. Venus is a morning star, but is becoming more and more insignificant. Moreover, she is very badly placed for the observer. Neither Mars nor Jupiter has yet come into view during the working hours of the ordinary amateur's night. Saturn, however, is visible from sunset to sunrise, and is a glorious object for the observer with the telescope. He is in a blank part of Cancer to the west of the Præsepe ("The Stars in their Seasons," map ii.). Uranus is, for our present purpose, invisible. Neptune is in that void part of the sky some 6° south of the Pleiades ("The Stars in their Seasons," map i.). The moon enters her Last Quarter at 7h. 25·8m. P.M. on the 4th; is New at 11h. 52·5m. P.M. on the 11th; enters her First Quarter at 1h. 59·2m. A.M. on the 20th, and is Full 2·4 minutes before noon on the 27th. She will occult three stars during February, but one of them only at an hour when the phenomenon is fairly observable. This is the 6th magnitude star d^1 Cancri, which will disappear at the moon's dark limb on the night of the 24th at 9h. 30m., at an angle of 112° from the moon's vertex, reappearing at her bright limb at 10h. 28m. P.M., at a vertical angle of 226°. At noon to-day the moon is in Virgo ("The Seasons Pictured," plate xxv.), which constellation she quits at 4h. A.M. on the 4th for Libra ("The Seasons Pictured," plate xxvi.). Travelling across Libra, she, at 8h. 30m. P.M. on the 6th, arrives at the western edge of the narrow northern spike of Scorpio. When, by 5 o'clock the next morning, she has crossed this, it is to emerge in Ophiuchus. Her passage through Ophiuchus is completed by 8h. 30m. P.M. on the 7th, at which hour she passes into Sagittarius. Her journey over Sagittarius terminates at 4h. A.M. on the 10th, and she enters Capricornus ("The Seasons Pictured," plate xxi.). She remains just 48 hours in the constellation last named, and at 4h. A.M. on the 12th quits it for Aquarius. Here she continues until 6h. 30m. A.M. on the 14th, when she enters Pisces ("The Seasons Pictured," plate xxii.). Travelling through that part of Pisces where it is conterminous with Cetus, she enters the last-named constellation at 2h. A.M. on the 15th, to re-emerge in Pisces at 11h. A.M. on the 16th. Proceeding in her onward path, she once more enters Cetus at 10h. A.M. on the 17th; and when she finally quits it, at 5h. A.M. on the 18th, it is to come out into Aries ("The Seasons Pictured," plate xxiii.). She is in Aries until 5h. A.M. on the 19th, at which hour she enters Taurus. In the course of her journey across the constellation last named, she comes, at 3h. 30m. A.M. on the 22nd, to the western boundary of the northern prolongation of Orion. It takes her exactly 12 hours to cross this, and, at 3h. 30m. in the afternoon of the same day, she emerges in Gemini ("The Seasons Pictured," plate xxiv.). She is in Gemini until 10h. 30m. A.M. on the 24th, at which hour she passes into Cancer. At 11h. P.M. on the 25th she leaves Cancer for Leo, as she does Leo in turn for Virgo at 10h. A.M. on the 28th ("The Seasons Pictured," plate xxv.). She is in Virgo when these notes terminate.

DARK AND FAIR.—Statistics tell rather a curious story about the relative attractiveness of dark hair and fair hair. A modern author states that, according to statistics, for every two dark-haired women who are unmarried there are three fair-haired ones. This in itself has no particular value, being, in fact, one of the customary stupidities of statistics. It tells nothing as to the relative number of dark and fair women who may marry, simply because it takes no account of the relative number of dark and fair women who exist in the community. If there were three fair-haired women for every two dark-haired women, the observed proportion between the fair and dark unmarried women would indicate no preference for one or the other hue. But as it is probable that there are more dark-haired women than fair-haired women, and even a great relative excess in the number of the former, the relatively small number of dark-haired women among the unmarried seems to indicate a well-marked preference on the part of the harder sex for the darker sisterhood. Albeit the evidence requires to be carefully analysed before this can be regarded as a demonstrated fact.

Our Chess Column.

BY "MEPHISTO."

A pretty game played at the Frankfurt Tournament.

FRENCH DEFENCE.

WHITE. Prof. Berger.	BLACK. Dr. Noa.	WHITE. Prof. Berger.	BLACK. Dr. Noa.
1. P to K4	P to K3	14. P to B5 (*f*)	K to R2
2. P to Q4	P to Q4	15. QR to K sq	R to Kt sq (*g*)
3. QKt to B3	B to Kt5 (*a*)	16. QKt to K2	QKt to Q2
4. P × P	P × P	17. Kt to B4	R to Kt4 (*h*)
5. B to Q3	KKt to B3	18. R to K2	P to Kt3
6. Kt to K2	Castles	19. KR to K sq	B to Kt2
7. Castles	R to K sq	20. P to B3	QR to KKt sq
8. B to KKt5	P to B3	21. Kt to K6 (*i*)	K to R sq
9. Kt to Kt3	P to KR3 (*b*)	22. Kt × R	R × Kt
10. B to KB4	B to Q3	23. Q to K3	Q to B8
11. Q to Q2 (*c*)	P to KKt4 (*d*)	24. Q to B4	Q to Kt7 (*j*)
12. B × B	Q × B	25. R to K8(ch) (*k*)	K to R2
13. P to B4 (*e*)	P to Kt5	26. R to Q8	Resigns (*l*)

NOTES.

(*a*) Not favourable for the defence; K Kt to B3 is better.

(*b*) Black is delaying the development of his forces too long, and this move weakens his King's side.

(*c*) White has his pieces in good play, and although he does not threaten B × BP immediately, that move may soon become possible.

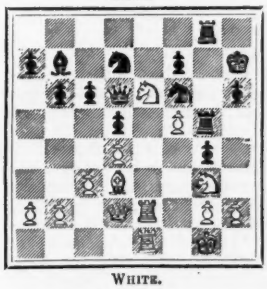
(*d*) Weakening his position still more; he should have played B × B.

(*e*) White follows up his advantage in development in the best possible way, giving Black no breathing time.

(*f*) If Black had played P × P, then R × P and QR to KB sq would have given White an advantage.

POSITION AFTER WHITE'S 21ST MOVE.

BLACK.



WHITE.

(*g*) B to Q2 was preferable.

(*h*) To prevent Kt to R5, but it was not good, although it would be difficult to suggest a better move. P to B4 might have been tried here.

(*i*) A very fine move, for if Black replies with P × Kt then 22. P × P (disc ch), K to R sq. 23. P × Kt to be followed by R to K7 or K6 winning (*see diagram*).

(*j*) The Queen is badly placed on Kt7.

(*k*) Black cannot take the Rook, for after Kt × R. 26. R × Kt(ch), K to R2. 27. P to B6 (ch) wins.

(*l*) White threatens to take this Knight as the Kt on B3 dare not move, and if Kt to B sq then Q to Kt8 or R to K7 or K8 wins.

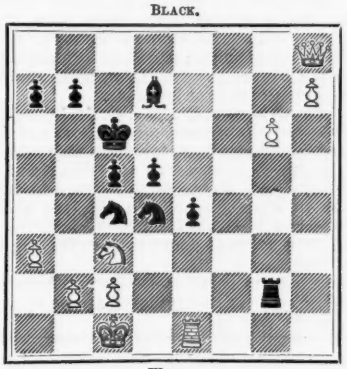
This game shows plainly the great disadvantage which arises by proper play through losing time in the opening.

A CHAPTER OF ACCIDENTS.

Nobody is infallible, and the player who makes the least number of mistakes is the strongest player. In Tournament play every mistake counts, whereas in match-play it does not to that extent, for if a player loses a game in a match, he can always recover himself if he is the stronger player. The following incredible series of mistakes occurred in the game, Gunsberg *v.* Burn, played in the Tournament of the B.C.A.

BURN.

BLACK.



WHITE.

GUNSBERG.

It was White's move, and he played—

Q to B6 (ch)

Q × Kt, P × Q, Kt to R2 would have won easily.

B to K3

Q × Kt

Still right, but White might have defended simply by Kt to Q sq, winning again easily.

P × Kt

Kt to R2

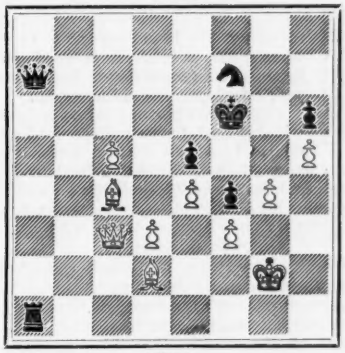
Fatal. If, instead of this, White plays simply P to R8 (Q), he still wins.

White has made three successive weak moves, and under certain awkward circumstances such play might give rise to grave conjectures. The result of the loss of this game was that Gunsberg was not absolute first, but tied with Burn.

Experience has proved that luck sometimes equalises itself. Having had bad luck in the above game, Gunsberg had a piece of good luck in his game with Bird, which, although it did not fully counterbalance the loss of the previous game, yet it enabled him to remain in front. The position was as follows :—

GUNSBERG.

BLACK.



WHITE.

BIRD.

Black had been fighting an up-hill game for a long time, and had no chance by correct play. He played

Kt to Q3,

which gave White the opportunity of mating in two moves by Q × P (ch), K × Q, and B to Kt2 mate. White, however, did not see this pretty but by no means so very obvious move, but played

B × P,

an inferior move, to which Black replied with

Kt × B

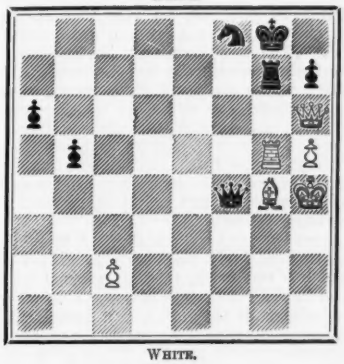
P × Kt Q to R7 (ch) and wins.

Even on his last move White would have done much better by playing Q × Kt, when the win would not by any means be assured by Black exchanging Queens, as White would remain with too many Pawns.

Yet another mistake occurred in the following game played in the tie. Black might have won here by Q to B7 (ch); K to R3;

GUNSBERG.

BLACK.



WHITE.

BURN.

Q to K6 (ch); K to R4; Kt to Kt3 (ch), and Black wins; for if P × Kt Black wins the Queen by Q to K8 (ch)—K to R3, Q to R8 (ch); but if R × Kt, then Q to K8 (ch)—K to R3, R × R wins. Instead of this, the game proceeded in the following manner :—

	R × R
Q × R (ch)	Q × Q
K × Q	P to R4
K to B6 !	P to R5
K to K7 !	K to Kt2
B to B3	P to R6
B to Q5	P to Kt5
K to Q6	K to R3
K to B5	

And the game was drawn after a few moves.

XUM

Our Whist Column.

By "Five of Clubs."

MATHEWS ON WHIST.

Ruffing and Forcing.

(*Continued from p. 47.*)

WHEN your partner shows a weak game, force him, whether or not you would otherwise be right in so doing. It is seldom right to refuse a ruff when your partner, if a good player, visibly intends you should do it; if he is a bad player your own hand should direct you.

Should your partner refuse to trump a certain winning card, try to get the lead as soon as you can, and play out trumps immediately.

When your partner plays a thirteenth card, and most of the trumps are unplayed, he generally means you should put a high trump to strengthen his own hand. [Either leave the card alone, to draw a trump from fourth hand, or trump with your best.]

Play of Trumps.

Take every opportunity (when sufficiently strong) to show your partner that you can command the trumps. In that case he will keep his own strong suit entire; whereas if the strength of trumps were with the adversaries, his play would be to keep guard on their suits, and to throw away from his own. [We have here, again, the true principle of the discard as determined by the position of trump strength.] If you have, as fourth player, to win a small trump, and you hold a sequence of three or more, win with the highest and play the lowest afterwards [thus informing your partner of your strength] Keep the trump card as long as you can when your partner leads trumps [or when you are strong in trumps yourself]; the contrary if an adversary leads them. Thus, in the former case, if the eight is turned up and you have the nine, throw the nine [when one or other of the two is to be played]; in the latter case, play the card turned up, even though you have the seven and six.

It is equally advantageous to lead up to as through an ace; less advantageous to lead up to a king turned up; and disadvantageous to lead up to the queen.

It frequently happens when you have led from six trumps, that after your second lead you remain with three or four cards, the best being in an adversary's hand. In such situations play a small trump. This has two advantages—first, it prevents the stopping of your partner's suit; and secondly, it gives you the tenace in whatever suit the adversary may lead. This, *mutatis mutandis*, will show that it is bad play to lead the best trump, leaving others in the hands of your adversaries. It may do good to keep it in hand, as you may be able to stop an adversary's suit with it; and it can answer no good purpose whatever to play it out. [The last statement is, however, too general, and is indeed flatly contradicted by Mathews's own statement in another place, where he says] If, however, they both have trumps and your partner none, it is right to take out two for one [though this in turn is too general, for often you play the enemy's game in so doing. Nothing but practice and experience can show what is best in particular cases. Still the general rule remains sound.] If you remain with the best trump, and one of your adversaries has three or more, do not lead your trump, as it may stop the suit of your other adversary.

Moderate players have generally a decided aversion to part with the best trump, though single, thinking that as they cannot lose it, and it can make but one trick, it is immaterial when it does so [and misled also in many cases by the hope of drawing two trumps from the enemy with it, if they can *lead* it instead of ruffing with it.] This is a dangerous fault [though in cases, of course, it may be judicious, never essential; usually] When your adversary plays out his strong suit, ruff it immediately rather than give his partner an opportunity to throw off his losing cards. Do not, however, go into the contrary extreme, or trump with the best trump, with small ones in your hand, for fear of being over-trumped. This is a nice part of the game, and can only be understood by practice and attentive reasoning.

The last trump is often of most material advantage to a good player. Thus, A has the thirteenth trump, with the ace and four small ones of a suit not yet played, of which the adversary leads the king and queen; by passing them both, A probably makes three tricks in the suit, but had he won the king he could not possibly make more than one. He might safely win the queen, however, and take out a third round, trusting to his thirteenth trump to bring in the remaining two, which would then probably be long cards in the suit. Without the thirteenth or a sure trump re-entering card A could not probably in any play make more than one trick in the suit.

When all the trumps are out, if you have the commanding card of your adversary's suit, you may play your own suit as if you held the thirteenth trump.

If the trumps remain divided between you and your partner, and you have no winning card yourself, it is good play to lead a small trump, to put the lead in his hand that he may play off any leading cards he may have, and so give you an opportunity to throw away leading cards. For instance, A remains with two or more trumps and two losing cards; B, his partner, with a better trump and two winning cards. It is evident that if A plays a losing card he will make merely his own trumps; but if he plays an inferior trump, and so puts the lead into his partner's hands, B will play his winning cards, while A throws away his losing ones. [The question is only of one trick if A only holds two trumps and two losing cards; but if A holds three trumps and two losing cards, his partner also holding two losing cards in the same suit or suits, A loses two tricks if he leads a losing card.]

SCIENCE IN WHIST.

Mr. Ram writes to us again as follows:—

"If a whister, who claims to play a game which may be legitimately styled 'scientific,' were after, say, the fourth round of each game, to put in black and white a list of the cards which he opined were in each of the other three hands, and were at the same time to make a forecast in detail of what the play of each of the four players for the remainder of that game would in his opinion be; and at the end of the said game were to compare the document with a coresponding statement which had been made by a fifth person who had actually seen the cards, how long would he continue to style his play 'scientific'? 'Five of Clubs' allows that 'bad' play may be successful against 'good' play for days together! In what proportion of games would a bad chess-player beat a good player? Is not the play in whist necessarily always a mere muddling along?"

Whist is no "mere muddling along," as Mr. Ram would find if he knew anything of the game. Since he evidently does *not*, it would be idle to attempt to convince him. As to his question, I simply reply that the experiment he suggests, if tried at a table where all the players knew the game, would quickly show even those who know little of whist the value of scientific play. Where two partners play scientifically against two who know little of whist, the influence of science is increased, though the power of reading all the hands is diminished. Albeit, it very seldom happens that among even the best players the first four rounds show the position of all the chief cards. Usually nearly all is learned by about the middle of the hand, after which nearly everything depends on strategy. But sometimes the position of several important cards remains hidden nearly to the last. Even then, however, the scientific player can tell the relative chances that such and such cards lie in such and such hands; and if he then plays according to his estimate of the chances, he is playing scientifically, and will come out right in the majority of instances.

When whist *is* mere muddling along, as, doubtless, all the whist Mr. Ram has ever played *has* been, the game is wearisome in the extreme. I do not care to sit down myself to play whist when even one of the four players is ignorant of the language and science of the game. With two such players as opponents, and a good partner I should be sure of winning heavily in the long run But it is infinitely pleasanter to be so matched by good play as not to win heavily or at all, in a series of games sufficiently long to eliminate the effects of chance.

N.B.—Mr. Ram can never tell the difference between scientific whist and bumblepuppy till he has played as one of a whist party, all four of whom are sound players.

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